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THE
NATURALIST:

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A
MONTHLY JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND

EDITED BY
THOMAS SHEPPARD, F.G.S., F.R.G.S., F.S.A.(SCOT.).
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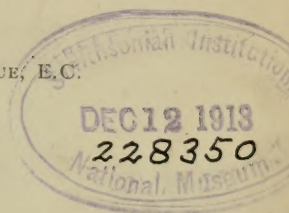
T. H. NELSON, M.B.O.U.

WILLIAM WEST, F.L.S.

RILEY FORTUNE, F.Z.S.

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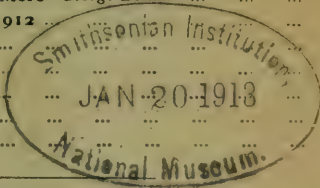
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NOTICE.

Yorkshire Naturalists' Union.

IN consequence of the regrettable decease of the Treasurer, Mr. H. Culpin, will members kindly forward their subscriptions to the Hon. Secretaries of the Yorkshire Naturalists' Union, at the Technical College, Huddersfield, for the time being.

Notes on The Natural History of Hornsea Mere.

BY

GEORGE BOLAM.

(Being the Report of the Yorkshire Naturalists' Union Wild Birds and Eggs Protection Committee's work in this area, with short notes on Spurn, Bempton, etc.)

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'THE NATURALIST' for 1912.

Edited by T. SHEPPARD, F.G.S. and T. W. WOODHEAD, Ph.D., F.L.S.

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NEW BRITISH FUNGI.

(For Key to figures see page 28).

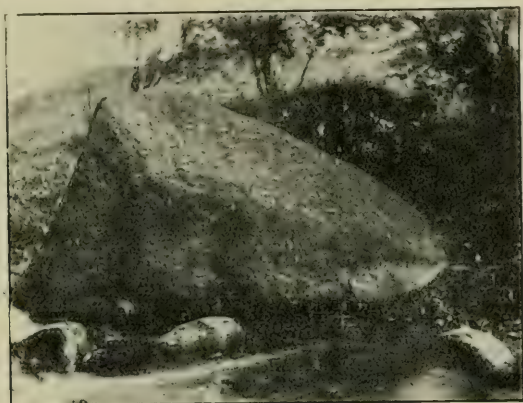
THE NATURALIST

FOR 1913.

NOTES AND COMMENTS.

A LARGE SHAP BOULDER.

The accompanying illustration is taken from a handy guide to the Ancient Saxon Parish of Whorlton in Cleveland, by the Rev. J. C. Fowler. It represents an unusually large erratic of Shap Granite, which is in the beck above the village of Swainby. The boulder is sub-angular, and measures 23 feet in circumference at the water level, and 17 feet 'over the back.' There are some brief geological notes of local interest



Shap Granite Boulder near Swainby, Yorkshire.

in the guide, in which, presumably by a slip, the ammonite is described as a fish.

STRUCTURE OF COAL.

We learn from *Nature* that Dr. W. E. Garforth has recently presented to the University of Leeds a large case which contains specimens showing the structure of numerous seams of coal from Yorkshire, Lancashire, etc. The lower part of the case contains coal-balls from the Halifax Hard Bed of Yorkshire, and the Bullion Mine in Lancashire. The coal balls are simply masses of vegetable material which were impregnated with Calcium carbonate while the tissues were still in a fresh condition, and so preserved during the subsequent changes which the surrounding vegetable matter underwent in the process of its conversion into coal. Many of the microscopic sections of these coal-balls measure as much as 8 inches by 6 inches, and shew the structure of the plants beautifully.

THE EARLIEST HUMAN SKULL,

What are apparently believed to be the oldest remains of man found in England, if not in the world, were recently exhibited at a Meeting of the Geological Society, and described by their discoverer, Mr. C. Dawson, and Dr. A. Smith Woodward, of the British Museum. They were obtained at Fletching, Sussex, with remains of elephant, hippopotamus, red deer, horse, and beaver. The human remains consisted of a skull and mandible, and flint implements of a primitive type were also found.

AND ITS APE-LIKE CHARACTERISTICS.

Dr. Woodward said the skull was very different from that of any class of man hitherto met with. It had the steep forehead of a modern man with scarcely any brow ridges, and the only external appearance of antiquity was found in the occiput, which showed that in this early form the neck was shaped, not like that of a modern man, but more like that of an ape. The brain capacity was only about two-thirds of that of an ordinary modern man. So far as it was preserved, the mandible differed remarkably from that of man and agreed exactly with the mandible of a young chimpanzee. It still bore two of the molar teeth, which were human in shape; if these were removed it would be impossible to decide that the jaw was human at all. The skull differed so much from those of the cave-men already found in Germany, Belgium, and France that it was difficult at first sight to interpret it.

CHARACTERISTICS OF CAVE-MEN.

All the cave-men hitherto found were characterised by very low foreheads and very prominent brow ridges resembling those of the full-grown modern ape. The new specimen was proved by geological considerations to be very much older than the remains of these cave-men. It was interesting to note in this connection that the new skull was closely similar in shape to that of a very young chimpanzee, while—as he had mentioned—the skull of the later cave-men had the brows of the full-grown chimpanzee. Therefore the changes which took place in the shape of the skull in successive races of early men were exactly similar to the changes which took place in the skull of an ape as it grew from youth to maturity. He inclined, therefore, to the theory that the cave-man was a degenerate offshoot of early man, and probably became extinct, while surviving modern man might have arisen directly from the primitive source of which the Piltdown skull provided the first discovered evidence.

R. I. P.

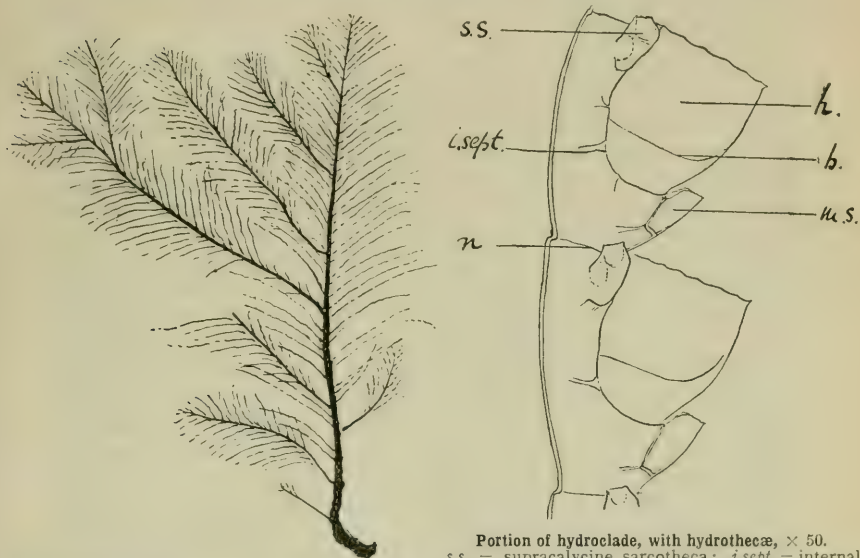
We have to record the decease of the Sheffield Junior Naturalists' Society and the Hull Society of Natural Science,

Naturalist,

formerly the Hull Junior Naturalists' Society. As both Sheffield and Hull had successful scientific societies before the formation of the newer societies mentioned, it is clear that, as a rule, there is not room for more than one society of this kind in any town. From what has recently taken place it is apparent that our remarks in reference to the publications of the Hull Junior Society, made in this journal some little time ago, have been justified.

HYDROID ZOOPHYTES OBTAINED BY HULL TRAWLERS.

From Dr. James Ritchie we have received a copy of his



Colony of *Cladocarpus campanulatus*, nat. size.

Portion of hydroclade, with hydrothecæ, $\times 50$.
s.s. = supracalcine sarcotheca; i.sept. = internal septum; n = node; h = hydrotheca; b = upper border of deeply staining portion; m.s. = mesial sarcotheca.

paper on 'Some Northern Hydroid Zoophytes obtained by Hull Trawlers; with description of a new species of Plumularian,' which is reprinted from the *Proceedings of the Royal Physical Society of Edinburgh*, Vol. XVIII, No. 4. Dr. Ritchie figures and describes the specimen under the name of *Cladocarpus* (?) *campanulatus*. He also describes *Halicornaria integra*, G. O. Sars., a rare species.

EVOLUTION OF THE CUCKOO.

The evolution of the cuckoo by natural selection, says Mr. G. W. Bulman in *Knowledge*, bristles with difficulties. Even if we imagine that a stage has been successfully reached where the habit of depositing its eggs in another bird's nest has been developed, a number of special points still call for

attention. There are, for example, the strange instincts and actions of the young cuckoo in the nest. In the cuckoo's respectable days it cannot have been the little demon it now is. It cannot have been in the habit of turning its brothers and sisters and eggs out of the nest. So it probably had not then the convenient hollow in its back for holding the eggs. And yet these habits, instincts and structure seem absolutely essential to the well-being of the young Cuckoo. Only by turning everything else out of the nest can it obtain sufficient nourishment for itself. And yet the first cuckoo hatched in a Titlark's nest cannot be supposed to have had these characters. It would get no advantage in the strange nest, and would probably be starved.

THE PRESENT POSITION OF BOTANICAL SURVEY.

Botanists will find in the recent issues of the *Transactions of the Botanical Society of Edinburgh*, several papers of more than usual interest. In Vol. 23, part II, pp. 53-59, Dr. Wm. G. Smith gives a useful summary of the present position of Botanical Survey in Britain. Plant-geography seeks to answer three questions (1) What plants occur in the world; (2) Where they occur; (3) Why they occur in one part and not in another. The data required to answer the first two questions result in Floristic plant-geography, the best examples of which are the excellent monographs in Engler and Drude's 'Vegetation der Erde.' The outcome of the third enquiry is Physiological Plant-geography as exemplified in A. F. W. Schimper's 'Plant-Geography.' Warming emphasises the relation of plant form to environment and considers that similar conditions of environment produce similar plant-form. The ideal botanical survey of a district or country should take account of all these points of view of plant-geography—floristic, distributional and ecological—and in all directions something has been done, but much remains yet to be done.

PUBLICATIONS.

The Survey memoirs published in Britain show that the work resolves itself into four processes:—(1) Selection of an area, preferably one little influenced by man. (2) Analysis of vegetation into its units and the recording of these on 6-inch Survey Maps. (3) Investigations on the influence of climatic, topographic, edaphic, and biological factors and their influence on the distribution of the various plant communities. (4) Examination of analysis from a synthetic standpoint. This involves the consideration of the origin and status of the plant communities. Sufficient progress has already been made to warrant broad conclusions being drawn from such investigations, *e.g.*, the view that 'succession' plays an important part in the present distribution of vegetation

Briefly stated, the theory is that vegetation in any habitat starts in one form (*e.g.*, lichens and mosses), and progresses through a succession of phases (*e.g.*, grassland and scrub) till it reaches a final phase which on many soils is a type of woodland. The study of these progressive phases of vegetation has become an important part of botanical surveys.

THE OXLIP AND PRIMROSE.

Mr. R. S. Adamson gives a short account of the 'relationships of *Primula elatior* and *P. vulgaris* to soil conditions' in *The Transactions of the Botanical Society of Edinburgh*, Vol. 24, pp. 84-86. He says that the oxlip (*P. elatior*) is extremely intolerant of non-calcareous soil, it demands a soil with high water content, especially in spring, but not a saturated one. This must be combined with a moderate but not excessive amount of lime. Where either of these conditions is not fulfilled it ceases to flourish and *P. vulgaris* occurs alone, which makes much less demand on the soil. The flowering season of the oxlip is very short; it starts a week or more later than the primrose and ceases a considerable time before, and how far this character influences the distribution would make a very interesting study. In the same number, Mr. A. Bennett gives an analysis of the British species of bladderwort (*Utricularia*), and this is followed by an account of a visit to Teesdale and Kirkby Lonsdale by the Scottish Alpine Botanical Club.

RIGHT OF WAY AT BRIDLINGTON.

It will be remembered that at the Bridlington Meeting of the Yorkshire Naturalists' Union Mr. Sheppard proposed a resolution in reference to the attempt to close the footpath south of the town at Bridlington. He followed this up by correspondence with the Commons and Footpaths Preservation Society, the Secretary of which, under date December 10th, writes as follows:—'I was directed to visit Bridlington in order to confer upon the matter with a Special Committee and the Corporation which has been dealing with the case. As a result of the Conference an interview took place with Mr. Pitt, who is the landowner concerned, and I am glad to say Mr. Pitt met in a very friendly manner the suggestion which I ventured to put forward, that, without inquiring with nicety into the somewhat complicated legal issues involved, an effort should be made to arrive at an amicable settlement. Mr. Pitt expressed his readiness to fall in with any fair arrangement, and an agreement prepared by the Society is in the hands of the Corporation, and will, I trust, be signed in the near future. It would obviously be improper for me to divulge the precise nature of the proposals which have been agreed to in principle by Mr. Pitt, but you may rest assured that under the settlement the needs of the public will be very fairly and even generously met.'

LOWER PALÆOZOIC ROCKS OF CAUTLEY.

In a paper 'On the Lower Palæozoic Rocks of the Cautley District,' recently read to the Geological Society, Prof. J. E. Marr suggests the following classification for the Ordovician rocks of the area :—

ASHGILLIAN.	{ Ashgill Shales.	} <i>Staurocephalus</i> Beds.
	{ Beds above the Volcanic Group.	
	{ Contemporaneous Volcanic Group.	
	{ Beds below the Volcanic Group.	
	{ <i>Phacops-robertsi</i> Beds.	

CARADOCIAN. *Calymene* Beds.

'The *Phacops* and *Calymene* beds are remarkably similar in lithological characters (dark calcareous shales and impure limestones), but the palæontological change is at the top of the *Calymene* beds, and the fauna of the *Phacops* beds is allied to that of the succeeding strata. In addition to other fossils, the Ashgillian strata contain graptolites, which have not been found, however, in the Ashgill shales. *Dicellograptus anceps* Nich. comes in the *Phacops* beds, and ranges up into the beds above the volcanic group. The Ashgillian beds are, therefore, the zone of *Dicellograptus anceps*. The succession in this district is much clearer than in the Lake District, and it is suggested that it be adopted as the type sequence for the Ashgillian beds of the North of England.'

PALLAS'S SAND GROUSE IN YORKSHIRE.

The following letter from the pen of Mr. Riley Fortune appeared in the press a little while ago :—'It has been reported to the Wild Birds' Protection Committee of the Yorkshire Naturalists' Union that a flock of between two and three hundred Pallas's sand grouse has been seen in the North Riding. The particular locality it is not necessary to specify. It is a strange time of the year for these birds to visit our country, and suggests that stress of weather or scarcity of food has influenced the movement, rather than, as has been suggested in connection with previous visits, that they are seeking to escape from an overcrowded area prior to the breeding season. There can be no mistake in the identification of the birds, as the observer who saw them is thoroughly acquainted with the species. In order to prevent the usual slaughter which has accompanied previous immigrations of this and other species into this county, this letter is written to draw the attention of the public to the fact that these birds are protected all the year round by special Act of Parliament. The Yorkshire Naturalists' Union Wild Birds' Protection Committee will take immediate action against any infringement of the Act of which they can learn, as they are determined to do all in their power to prevent the killing of these or any other rare birds which visit the county. "A word in season" may prevent someone "pleading ignorance" of the Act.'

YORKSHIRE NATURALISTS AT HULL.

THE Annual Meeting was held at Hull on the 14th Dec. last, and the Union is much indebted for the efforts put forth by the inviting Societies, the Hull Geological and the Hull Scientific Club, and particularly to Mr. Thomas Sheppard, F.G.S., Mr. J. W. Stather, F.G.S., and Mr. T. Stainforth, B.A., on whom fell the greater portion of the work in connection with the local arrangements, and who had obviously done everything to ensure the meeting being a success.

In the morning a party of Geologists, under the guidance of Mr. J. W. Stather, visited the Kelsey Hill and Burstwick Gravel Pits, near Keyingham, where the extensive sections in the exposed glacial beds were examined. These deposits, which are very fossiliferous, are of glacial age, and extend across Holderness in the form of a range of low hills. In addition to the only remains of fossil Walrus found in Britain, the bones of the Mammoth, Elk, Reindeer, Bison, and Rhinoceros have also here been found in them.

After the Sectional Meetings, a large number of officials, members of the permanent General Committee, and delegates from the Affiliated Societies, twenty-seven of whom were represented, assembled in the Lecture Hall of the Royal Institution. The Report proved very satisfactory. Good results scientifically had accrued from the excursions, while the sectional reports voiced the activity of the members of the sections. The announcement that Mr. Harold Wager, F.R.S., Leeds, had accepted the position of President for 1913 was received with acclamation; all the other officials were also unanimously re-elected.

A most favourable financial report was presented by the Treasurer, Mr. H. Culpin. The statement that, as a result of the year's working, the substantial saving of £56 9s. 10d. had been effected, reducing the outstanding debt of the Union to £63 6s. 9d., being received with applause. A full text of the Annual Report appears in this issue of *The Naturalist*. Mr. Sheppard stated that the Secretary of the Commons and Footpaths Preservation Society informed him that through the kindness of Mr. Pitt, an arrangement had been arrived at for the public to pass over his land, to connect up with the footpath along the cliffs south of Bridlington.

After the preliminaries at the evening meeting, when Mr. Wager occupied the chair, the retiring President, Mr. John W. Taylor, Leeds, delivered an excellent though technical address on the 'Dominancy and Phylogeny in Nature as affecting distribution.' Briefly, he spoke of the qualities and causes which enabled certain types of the human race, animals, insects and plants, to assert their dominancy to the detriment

of weaker forms of life. As Mr. Taylor is such an expert authority upon the Mollusca, it was only natural that he should devote the greater portion of his address to the operation of these processes among the mollusca, and instancing *Belogona siphonadenia*, he showed how it was able to make home anywhere, and drive out the native races. The series of coloured maps of the world, showing dominancy and sub-dominancy of various forms of life, thrown upon the screen by the lantern, emphasised to a greater degree the many salient points of Mr. Taylor's address. A cordial vote of thanks to Mr. Taylor for his address, and for the great interest he has taken in the work of the Union throughout the year, was unanimously recorded.

At the close of the Meeting a conversazione, under the auspices of the two inviting Societies was held in the Museum, and the guests were received by His Worship the Mayor of Hull, Alderman J. Brown, and Mrs. Brown; and the Sheriff of Hull and Lady Sheriff, Mr. and Mrs. Hubert Johnson. In addition to the various well arranged and excellent archæological, botanical, and other natural history exhibits within the Museum of Natural History, Applied Art, and Antiquities, the Members of the Hull Societies made special exhibits, as follows:—Mr. H. M. Foster, living Bacteria; Mr. J. Thompson, specimens of Polyzoa; Messrs. F. Turner and A. Werner, living Diatoms and other forms of plant life; Messrs. J. F. Robinson, E. Lamplough, and B. Cook, slides of living and mounted specimens; Mr. T. Sheppard, sections of rocks from the Boulder Clay; Mr. J. W. Boulton, a number of typical East Riding Plants; Mr. J. F. Robinson, a collection of Seaweeds; Mr. A. J. Stather, the Yorkshire Naturalists' Union's Album of Geological Photographs; Mr. J. W. Stather, samples of 'Moorlog,' an interesting peat-like deposit from the Dogger Bank in the bed of the North Sea, together with a collection of seeds, shells, etc., obtained from it. Amongst the special Museum exhibits were Prehistoric objects from the 'Duggleby Howe' Tumulus sent by Sir Tatton Sykes, Bart., and early Microscopes dating back to 1725.

Refreshments were kindly provided by His Worship the Mayor and Mrs. Brown.

Heartly thanks were accorded to the Mayor for his hospitality, to the two inviting Societies, and to the Hull Museums' Committee, the response of the Mayor, and Messrs. W. J. Strachan and J. Thompson bringing a most successful gathering to a close.

W. E. L. W.

The Report of the Warrington Museum, for the year ending June 30th, 1912, contains details of the various additions during the year. The Wild Flowers table has again been a successful feature, and the curator is evidently devoting attention to 'by-gones.' The mineral collection is being rearranged.



Fig. 1.—Twilight Haunt of Natterer's Bat (*M. nattereri*).

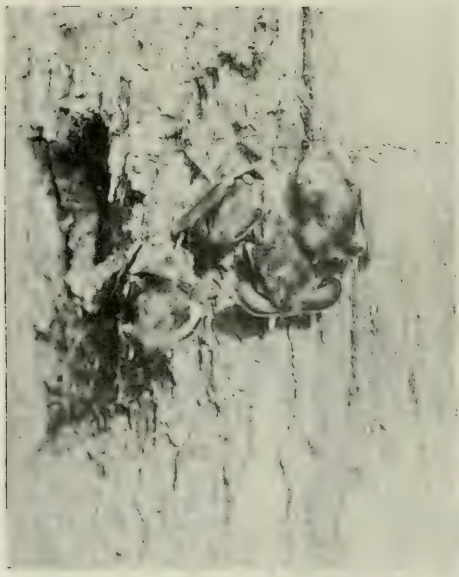


Fig. 2.

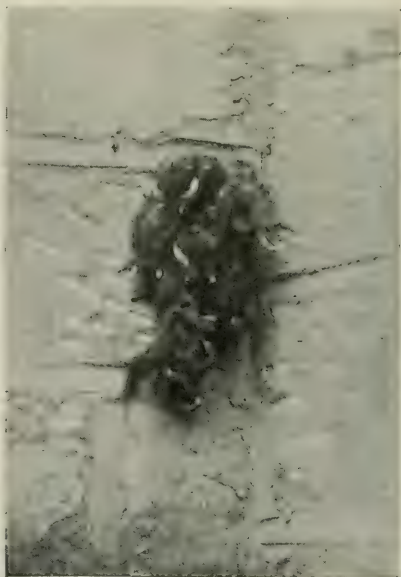


Fig. 3.

Long-Eared Bats (*Plecotus auritus*).



Fig. 1.—Cottage, in roof of which *Pipistrelle* Bats congregate.



Fig. 2.—Home of *Leisler's* Bat (*V. leisleri*).

NOTES ON THE HABITS OF BATS.

ARTHUR WHITAKER.

(PLATES II. AND III.).

IN the autumn of 1906 I contributed to *The Naturalist* a short article on bats in which I endeavoured to point out some of those characteristics of flight and haunt which enable a careful observer to recognise the different species he sees on the wing with some degree of certainty. Since then I have been able to supplement my notes about one or two species.

Leisler's bat (*N. leisleri*) though similar to the Noctule in its style of flight, looks very distinctly smaller when seen on the wing. It usually flies at a lower altitude than the latter species, preferring to keep below the level of the tree tops. It appears to feed largely upon moths, and for the purpose of catching these will not infrequently wheel round and round some tree for a long time. A large ash growing in my own garden at Kingwell very often attracts one or two bats of this species at dusk. I have often watched them circle round the tree fifteen or twenty times in quick succession, catching the moths which were hovering and fluttering near the foliage. In one case a rather large moth, probably *T. pronuba*, was flying slowly beneath a low branch not more than a yard in front of my face when, with a quick downward sweep, it was captured by one of these bats. The moth was seized in the mouth and the bat ascended with it to a considerable altitude, making off in a straight line apparently until the moth was consumed, for after flying slowly away for some twenty seconds the bat suddenly turned and swept down again to the ash tree, round which it recommenced to circle.

The period of hybernation in this species is probably about the same, and subject to similar interruptions owing to the vicissitudes of temperature, as in the case of the Noctule. On mild evenings, or occasionally afternoons, in late autumn, they may not infrequently be seen on the wing. As I write this at dusk on the evening of November 6th, I can see from my office window one or two bats of this species hawking about over the garden and adjoining fields. It was first observed on the wing this year on the 3rd of March, when I saw a single specimen. The following evening I saw two abroad. The weather then became colder and it was not until the end of April that I again saw them flying.

Natterer's Bat (*M. nattereri*) might very easily be confounded with Daubenton's when seen on the wing. Although the species occurs very commonly in this district, and I have taken many scores from their hiding places at different times, I was never able to identify it in its twi-

light haunts with absolute certainty until last summer. On the 12th of August, 1911, in company with Mr. Armitage, I was walking round Stainbrough Park, at dusk, when our attention was attracted by several bats which were skimming about over one of the smaller ponds. Their flight was if anything rather more rapid than that of Daubenton's Bat, and they did not skim *quite* so close to the water's surface as that creature usually does, flying at an average height of 12 or 18 inches above the water. They flew about in an erratic, zig-zag manner, but kept most persistently over the water, always turning as soon as they reached the side, except once or twice when they left the pond and made off in a straight line for another rather larger sheet of water near by. From these expeditions they returned in a few minutes, still skimming along fairly near to the ground. So much did the flight of these bats resemble that of Daubenton's that in spite of the slight differences I have pointed out we were not at all sure as we watched them whether they were of that species or not. In order to settle the point we borrowed a gun from a keeper's house near by and my friend succeeded in dropping one of the bats into the pond. We had two dogs with us at the time but neither of these animals could by any means be persuaded to touch the bat, though they both swam out and sniffed at it many times. I contrived to drop a second bat into the water within easy reach of the side. We were eventually able to secure the first with the aid of a long branch. Upon examination we found that we had two Natterer's bats, both adult males.

On the 15th of July, 1911, Mr. Armitage and I went to examine a colony of bats which we had been informed occupied the roof of a cottage at Stainbrough. From what we were able to learn this is a very old colony which has kept to the same den for many years. Unfortunately there was no trap door in the bedroom ceiling of the cottage so that we were not able to get inside the roof where the bats had made their den. The bats only appeared to have one small entrance and exit hole, a little crack three or four inches long near the apex of the gable, and just under the edge of the slates. We decided to try and catch the bats as they came out for their evening flight. A hurried search round the neighbourhood for a ladder met with only partial success. The best three short ladders available when spliced together with the two best clothes lines procurable, answered our requirements so far as length was concerned, though in every other way they left very much to be desired.

It was quite dusk and the first bats had begun to emerge before our preparations were fully completed. The bats came out fitfully, three or four in quick succession, then a pause

perhaps of several minutes' duration, and then several more. We estimated that we saw well over sixty bats, all *Pipistrelles*, leave the den, and thirty-one of these we secured for examination. Probably this does not nearly represent the strength of the colony, for judging by their squeakings, many were still in the hole and others were yet emerging when we left. I was surprised to find that without a single exception the thirty-one specimens procured were females. All seemed in poor, rather emaciated condition, and some of them were quite mangy. A number were destitute of fur on the breasts, which led me to think they had been suckling young, but it was curious that we found no juveniles. I had expected to find some quite tiny young ones at the time. Possibly the exceptionally fine dry season had made them rather earlier than usual.

Some colonies of bats occupy the same dens for a very long time. For instance, on the 17th of September, 1911, I was at Gringley-on-the-Hill, near Doncaster, and had pointed out to me a small hole in the side of an old farm building from which 103 bats had been counted to emerge at dusk the previous day. My informant, a man of over forty-five, told me they had occupied the same hole ever since he could remember, and that his father had told him they were there even when he was a boy. It was too cold on the evening I was there for many bats to be stirring, and I only secured one specimen, a male *Pipistrelle*. Two other bats netted as they flew in a stack-yard near by, were also of the same species. In all probability the colony was composed of bats of this kind.

On September 28th, 1912, I went to hunt for bats in the roof of a small church standing in a well wooded private park, near Barnsley. We ascended first up dusty ladders and through a trap door into the darkness of the belfry, where the sexton informed us he had often seen them 'hanging like bunches of grapes.' Here however, we were not successful in discovering any. Passing from the belfry down three or four steps we got into the main roof, a long, dark, warm place, divided by six or seven large timber roof trusses. For some time our search only resulted in the discovery of three or four dead and mummified specimens of the Long-eared Bat (*P. auritis*) which were lying on the floor. Then I succeeded in discovering two living bats of the same species hanging separately from the roof timbers. While trying to photograph these by the light of some magnesium wire we became aware of one or two bats which were flitting silently round us in the gloom. This convinced us that there must be more of them somewhere, so we renewed our search. After a little time one of the party suddenly called out 'Here they are.' We hurried to the place and saw a cluster of thirty or forty Long-eared Bats clinging all in close proximity at the

back of one of the side trees. They woke up quickly when the light of our candles shone upon them, and began to drop off and fly about, re-assembling from time to time in smaller clusters in different parts of the roof. I procured twenty-two specimens for examination and found these consisted of eleven males and eleven females. The average wing expanse of the eleven males was 9.33 inches and of the females 9.56 inches. This confirms my opinion that in the case of the Long-eared Bat, (and probably some other species also), the female is usually larger than the male.

On Plate III., Fig. 2, is a picture of an old oak tree on the Stainbrough estate, in which a colony of Leisler's bats have made their home. The small x to the left of the main trunk, and fairly high in the picture, indicates the position of the den, which is in a long slit in the dead stump of a broken branch immediately above it. On Plate II., Fig. 2, four Long-eared Bats are shown disturbed by the removal of a large piece of loose bark under which they were clinging. Fig. 3 is a typical 'cluster' of long-eared bats clinging to an old wall. Many of the bats in the centre are quite buried by others which are clustered over them. In the group shown there were 22 bats. Plate III., Fig. 2, is from a photograph taken by Mr. E. H. Wakefield.

On plate Plate II., Fig. 1, is a twilight haunt of Natterer's Bat, the place where the two specimens referred to above were obtained. Plate III., Fig. 1, shows the cottage inhabited by the colony of Pipistrelles. The position of the exit hole is marked by a small x immediately beneath it, and near the apex of the gable.

The difficulty of solving many interesting points relating to the distribution and relative abundance of different species of bats lies chiefly in the meagreness of the data available. May I remark here that I shall be exceedingly grateful to any reader who will, at any future time, forward to me any specimen, either alive or dead, which may happen to fall in his way. These I should be pleased to name and immediately return or liberate as desired. The fullest possible particulars relating to date and place of capture should accompany any specimens sent, which should be addressed to me at Kingwell, Worsboro' Dale, Barnsley.

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On the suggestion of Mr. Mark Sykes, M.P., Sir Tatton Sykes has kindly sent for exhibition in the Hull Museum the objects of pre-historic date in his possession. These include the contents of the famous Duggleby Howe burial mound, which contained flint and bone weapons and implements of exceptional interest; a pre-historic jet necklace containing several hundred beads; a fine series of pre-historic implements in flint, sandstone, bronze, etc., and some earthenware vases taken from British burials on the Yorkshire Wolds.

THE YEAST-FUNGI IN NATURE.*

F. A. MASON, F.R.M.S.,
Leeds.

THE terms Yeasts and Yeast-Fungi used in the following notes refer to those minute, mono-cellular, spore-forming organisms, belonging to a family bearing the significant title *Saccharomycetæ*. It is desirable to make this explanation because there also exists a large number of mono-cellular plants which so much resemble the true yeasts as to make it almost impossible to distinguish, by ordinary microscopical examination, the one group from the other; these include such organisms as *Torula*, *Mycoderma*, *Oidium*, etc., which may be described as Yeast-like Fungi, and the only difference which need be remarked here, is that they do not under any known circumstance produce spores.

The common belief that Yeasts may be found only in a brewery or associated with commercial products of fermentation has no foundation in fact. These organisms are as widely distributed in nature as any of the fungi, and whereas some 80 species have been identified, only one is cultivated for brewing purposes, at any rate so far as British practice is concerned. Unfortunately, other species do sometimes find their way into a brewhouse, but every advantage that science can teach is exercised in endeavouring to check their entry or to combat their development should it be effected.

In company with their relatives, the moulds, and their more distant friends, the bacteria, yeasts may be found everywhere if proper precautions are taken to secure them. An exposed Petri dish containing nutrient gelatine, preferably prepared with malt-wort, will reveal their presence in the atmosphere. Here they may be detected all the year round, but Spring and Autumn are the seasons in which they are especially abundant; a fact of great interest in its relation to the varied life-history of these minute organisms.

Most commonly do they occur upon the surface of ripe and ripening fruit. Apples, pears, plums, strawberries and especially grapes are the chief breeding places; some species on one, some on another, often several species side by side on the same fruit. All the yeast cell requires in the way of nutriment is amply provided by the sweet juices of the fruits, and in these situations the yeasts develop by the apparently simple reproductive process of budding. Under the most favourable conditions with regard to moisture, temperature and food supply, reproduction can proceed with almost inconceivable rapidity, but fortunately perhaps, this ideal state of existence does not much prevail in nature.

* Read at the meeting of the Yorkshire Mycological Committee, 1912.

By the time that fruits are fully ripe the yeasts have developed large colonies. Then come Autumnal winds, by means of which, masses of cells are swept from their summer habitat to become for a time part of the floating populacé of the atmosphere. Finally they settle down to the soil where they are afterwards joined by those cells which, having so far escaped removal by the winds, remain on the fruit only to be washed down by the more searching action of the rain.

Thus, by wind and rain and to some small extent by the agency of insects and birds, the yeasts are conveyed to their secondary breeding place, the soil. This situation, although not of primary importance for purposes of reproduction, is the principal habitat of the *Saccharomycetæ*; a fact which has been demonstrated by Hansen, Wortmann and Müller-Thurgau. Hansen, who devoted the greater part of a long life to the study of the yeast-fungi, in investigating this aspect of their life-history, made analysis of hundreds of samples of soil from various points right across Europe. The results of this work, besides proving the soil to be the chief habitat of the *Saccharomycetæ*, threw valuable light upon their distribution with regard to the nature and environment of the soil in which they occur. For instance, in one series of 200 analyses true yeast fungi were found in 67 per cent. of samples under fruit trees and fruit bushes; in 30 per cent. of those from under deciduous and coniferous trees and only 19 per cent. in samples of soil from distant fields.*

On the surface and in the soil even to a depth of 12 inches† yeasts spend the winter in safety, during which time reproduction takes place only to a small extent and then mostly by means of spore-formation, a characteristic feature of the true yeast-fungi. This process, as well as increasing their numbers, provides an added security (the spore being able to stand adverse conditions much better than the parent cell) and at the beginning of Spring when windy weather is again the rule, the cells or their spores are once more ready for transference to their primary breeding places, the fruits.

The bark of various trees is also a common habitat of yeasts. In some instances vast colonies of these organisms are found in viscid, slimy masses to so great an extent as to be considered a disease. A good many such cases are recorded in continental literature, and under the title 'Slime-flux,' this condition is referred to in the 'Text Book of Plant Diseases,' by Massee. No instance, however, of its occurrence in this country is given; an omission, no doubt, on account of its relative non-importance from a phytopathological point of view; but I have met

* Lafar's (Salter) Tech. Mycology, II., p. 254.

† Müller-Thurgau.

with several instances in Yorkshire which have furnished exceedingly interesting material for study, one of which may be related.

In the Winter of 1904 I found at Adel, near Leeds, a Birch tree suffering very severely from the ravages of *Polyporus betulinus*, and that the disease was of long standing was evidenced by the prolific crop of sporophores. In the following spring I again visited the tree and found the work of its fungus foe completed. The top portion had been blown off, leaving a long oblique fracture, and the whole of the fractured surface upon the standing portion of the trunk was covered with a greyish-coloured slime, a patch certainly not smaller than two feet long by four or five inches wide. A small quantity of the substance was collected and upon examination I was astonished to find that it consisted entirely of yeast-cells, which proved to be those of *Saccharomyces Ludwigii*. After preparing a pure culture of the yeast it was transferred to agar medium in Freudenreich flasks and preserved for future observation. One of these flasks remained unopened until 1911 when it was again examined ; it was then found that most of the cells had developed spores, but the culture still contained vigorous cells capable of budding.

Two interesting points may be mentioned in connection with this occurrence of *S. Ludwigii*. The aggregations of this organism, producing Slime-flux, are usually found upon the oak and have only occasionally been recorded as occurring upon other trees ; the present case is concerned with the birch. As a rule, the slimy exudations upon trees consist of a mixture of organisms such as *Endomyces*, *Yeasts* and *Torulae*, but here *S. Ludwigii* existed as a pure culture so far as it is possible for this condition to obtain under natural conditions.

As will have been already gathered, the various species of yeasts cannot be determined by microscopical examination alone. The cells as found in nature must be isolated ; a pure culture prepared, grown in various nutrient media, and spore formation be induced. These operations demand a fair knowledge of microscopical technique and some experience in methods of pure culture, but not more than are required of the mycologist working at the micro-fungi in general and having the requisite skill to determine specific differences amongst the members of various families, say of the *Phycomycetes* and *Hyphomycetes*.

A species of yeast has been found upon Holly Berries ;* systematic examination of the various woodland fruits would doubtless reveal the presence of others, some probably new. There are two genera, each embracing but a single species

* *Sacharomyces ilicis* Grönland.

and in each case recorded only by a single observer ; one species in a hazel nut,* the other in the stomach of a water flea. † Some of these organisms occur in the intestinal tract of insects, others have been found in the stomachs of animals. Many may be obtained from the rind of cheese, sauce, jams and other foods found in the household larder. At least one species is known to all ; it is the common cell *S. cerevisiae* used by the professor of botany in ushering his pupils into the mysteries of cell life and structure, and, as is well known, is the yeast used in the production of beer and in the making of bread.

These brief notes partake somewhat of the nature of a plea for recognition of the yeasts by enthusiastic workers amongst the fungi. Sufficient has been said to indicate the ubiquity of yeasts in nature and to point out that there is scope for the study of these lowly organisms from aspects other than those of purely economic utility.

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The Entomologist's Monthly Magazine for December contains two excellent coloured plates of exotic lepidoptera.

An address to the Linnean Society on 'Minute Life on our Sea-beaches,' by Prof. W. A. Herdman, is printed in *Nature*, No. 2248.

Mr. S. E. Brock has an interesting paper on 'The Tufted Duck in the Nesting Season,' in *The Scottish Naturalist*, for December:

Among many interesting articles in part 20 of Cassell's *Nature Book* is a charmingly illustrated paper on Lakes and their Formation, by the late Joseph Lomas.

'Two Crustaceous Brown Algae from the Danish West Indies,' is the title of a paper by F. Boergesen, in English, appearing in *La Nuova Notarisia*, Serie XXIII., published at Modena, Italy. The species described and figured are *Ralfsia expansa*, and *Aglaozonia canariensis*.

In an article on 'Birds and their fondness for Man,' in *The Animal World*, No. 84, Mr. A. R. Horwood seriously tells us that a bird 'made its nest in a horse's tail at Conference Hill, Blood River, during the Zulu campaign. The nest was discovered by a trooper in grooming his charge, and the fact was reported to the commanding officer.'

We regret to notice the announcement of the deaths of W. B. Tegetmeier, aged 96, an authority on poultry, etc. ; of R. H. Traquair, the zoologist and authority on fossil fishes, aged 72 ; of W. F. Kirby, entomologist and student of Folk-lore, aged 68 ; of W. R. Jeffrey, the entomologist, aged 76 years ; of Sir George Darwin, the physicist, aged 67, (Sir George was the second son of Charles Darwin) ; and of Rowland Ward, author and taxidermist.

After informing us that 'the entire scientific world is in a remarkable state of ignorance with regard to flint,' Sir E. Ray Lankester, in a recent issue of *Nature*, says 'by the word "flint," we understand the black-looking siliceous nodules which occur in the upper chalk of this country' ; that 'it is clear . . . that the flint was deposited in cavities formed after the solidification of the chalk,' and that 'the silica deposited as agate in trap rocks had probably a different origin from that of flint.'

* *Nematospora Coryli* Peglion.

† *Monospora cuspidata* Metchnikoff.

In Memoriam.

HENRY CULPIN—1861-1912.

ALL northern naturalists will receive with great regret the news of the sudden death of the Honorary Treasurer of the Yorkshire Naturalists' Union, Mr. H. Culpin, of Doncaster. He was found dead at his desk on the morning of Monday, 23rd December, within a very short time of reaching the office.

Those who were at the Annual Meeting of the Yorkshire Naturalists' Union, only a few days before his decease, saw in Mr. Culpin a powerfully-built man in the pride of life, and



The late H. Culpin at the source of the Nidd, 1912.

none could possibly have imagined that that life was so soon to be brought to a close.

In connection with his work as Treasurer of the Yorkshire Naturalists' Union, Mr. Culpin's services were incalculable. He took over the work at a time when the finances of the Union were in a somewhat critical state, and by his perseverance, and by exercising rigid economy in every possible direction, was able to point out at the recent Meeting that the financial status of the Union was quite sound, and within easy distance of having a balance on the right side. Mr. Culpin's experience as Accountant to the Great Northern Railway Company peculiarly fitted him for the position he

held, and the lucidity of his Reports on the Union's finances will long be remembered by those who heard them.

In his own town of Doncaster, also, he took a prominent part in the work of the local Scientific Society, of which he had been a member for twenty years, and occupied almost every office, including that of President. He was also instrumental in connection with the formation of the town's Museum, and gave practical assistance by the gift of many local geological specimens.

Mr. Culpin's most valuable scientific work, however, has been in connection with the geology of the Doncaster neighbourhood. In recent years the district in which he lived has been bored in all directions for coal. As each boring has progressed, Mr. Culpin, practically single-handed, has recorded, with most minute accuracy and detail, the various beds passed through. He has also collected extensively from them and correlated them one with another. The results of this work are proving not only scientifically useful, but of great practical and economical importance. There is no question that were it not for this painstaking work, much that is of value would have been for ever lost. One of his discoveries—a bivalve previously undescribed, (*Aviculopecten culpini*)—was named after him.

In a paper read at the Sheffield Meeting of the British Association he was able to add four to the list of five marine bands previously recorded in the Yorkshire Coal Measures.

He also paid considerable attention to the usually neglected and difficult Permian strata, and details of his discoveries have appeared in *The Naturalist*. The Glacial geology of the district also attracted his attention.

The Naturalist has contained the following articles from his pen. They include his first published paper, and his last :— 'An Exposure of Upper Coal Measures near Conisborough' (Feb., 1905, p. 40); 'Recent Exposures of Glacial Drift at Doncaster and Tickhill' * (Sept., 1906, pp. 325-327); 'Geological Notes on Askern' (Oct., 1906, pp. 369-370); 'Geology of Thorne' (Sept., 1907, pp. 317-318); 'Marine Beds in the Coal Measures near Doncaster' (Feb., 1908, pp. 39-40, and May, 1908, p. 169); 'Permian Fossils in the Doncaster District' (Aug., 1909, pp. 279-280); and 'Marine Bands in the Yorkshire Coal Measures' † (Oct., 1910, pp. 375-376).

Details of his work have also appeared in the reports of the Yorkshire Naturalists' Union's Carboniferous Fauna and Flora, and Erratic Blocks Committees. The Proceedings of the Yorkshire Geological Society contain two important papers by him dealing with the marine fossils in the coal measures,

* This and the preceding paper were written jointly with Mr. G. Grace,

† These two papers were read before the British Association; and abstracts appear in its Reports for the respective years.

and 'A Post-Permian Fault at Cusworth, near Doncaster;' and summaries of his papers have also appeared in *The Geological Magazine*, *The Colliery Guardian*, and in the *Reports of the British Association*.

In Mr. Culpin the Yorkshire Naturalists' Union has lost a keen supporter; geological science has lost a devoted worker; but the greatest loss of all falls upon his widow, with whom we feel sure every reader of this journal sympathizes and trusts that her two sons and daughter may bring her comfort in her future lonely road through life.—T.S.

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UTRICULARIA OCHROLEUCA HARTM. IN YORKS.

ARTHUR BENNETT,
Croydon.

THIS plant which was described by Hartman in the *Botaniska Notiser*, pp. 25-32 (1857), I possess from 16 Counties of Scotland, Westmorland (Fox sp.), and Dorset (Linton, sp.), L. Lancashire (Coomber sp.), Mr. Martindale, of Kendall, now writes me that he has specimens from Strensall Common (V.C. 62) gathered in 1881 by the late Mr. George Stabler.

Mr. J. G. Baker in North Yorkshire, *Transactions Yorkshire Naturalists' Union*, part 17, 1891, pp. 355, gives only *U. vulgaris* L., and *U. minor* L., not naming *intermedia* Hayne. Every specimen named *intermedia* should be carefully examined, and most will probably prove to be *ochroleuca*. At present I have only seen *intermedia* from Norfolk (Messrs. Burrell & Clark, sp.), and E. Perth, Sturrock sp. in Perth Museum, it is evidently rare; probably will be found to be most abundant in Ireland.

U. ochroleuca may be distinguished from *intermedia* by possessing bladders here and there on the leaves (as well as on separate stems) which *intermedia* never has. The winter-buds in *ochroleuca* are densely hairy, the leaves have marginal and apical hairs with compound cells at the base, *intermedia* has simple hairs, and the apex of the leaves generally rounded with a mucro, not acute-acuminate as generally in *ochroleuca*. Notes on *ochroleuca* will be found in *Annals Scottish Natural History* (1903), pp. 123-251, and *Transactions of Edinburgh Botanical Society* (1910), p. 61.

Mr. F. A. Lees, in *The Flora of West Yorkshire*, p. 373, remarks that the Askham Bog plant, has been suggested to be *U. neglecta* Lehm. There are specimens of *neglecta* (*U. major* Schmid.) in the Cardiff Museum Herbarium from 'Potteric Carr.' Unfortunately I did not record the gatherer.

In the Edinburgh Herbarium there are specimens from Chat Moss, Herb, Tatham ex. W. Armstead, under the name of *vulgaris*. This is V.C. 59, S. Lancashire.

FIELD NOTES.

BIRDS.

Bird Notes from Whitby.—On July 27th, a woodcock was found in this district sitting on four eggs. The bird continued to sit until August 6th, when it left the eggs, two of which contained chicks. A common buzzard was trapped a few miles from Whitby about September 7th, and early in November an immature female Peregrine Falcon was taken in a trap in this neighbourhood. Small parties of Shags were flying south along the coast on November 29th, and two immature birds were shot.—THOS. STEPHENSON.

Unusual Fate of a Long-Eared Owl.—Some little time ago a friend in the South sent me a live Long-Eared Owl. I had intended 'enlarging' it in one of our woods, but in the meantime, kept it in an outhouse. This outhouse formerly swarmed with mice. I set a few 'Little Nipper' traps in order to catch some to feed the owl with. Every day I found these traps sprung, and in most cases some little distance from the point where they were set; in some cases a big spot of blood being either on or near them. I could not understand this, but one morning I found a three-parts-grown rat in one, caught by the nose. I gave him to the owl, for whom he formed a pleasant meal. On the evening of the 11th, I placed food for the owl, who soon came down to it, but on the following morning he was missing. As it was impossible for him to get out I was puzzled. A search revealed a heap of his feathers and a small portion of the carcase. The rats had overcome him and made a meal of him. As the bird was in perfect health and condition, I can only surmise that a party of rats must have attacked him, perhaps over a bit of meat, and had come off best in the struggle.—R. FORTUNE.

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LEPIDOPTERA.

***Pterophorus phæodactylus* Hub. in Yorkshire.**—In the appendix to the list of Yorkshire Lepidoptera, Mr. Porritt recommends the deletion of *phæodactylus* as a county species; it is therefore of considerable interest to record that on July 10th, 1902, I found this species in plenty flying over and settling upon its food plant, Rest Harrow (*Ononis arvensis*), at Sledmere. I boxed about twenty specimens to renew my series, and might easily have taken three or four times the number. At the same time and place I captured a couple of *Cnephasia lepidana* Curt. = *politana* Haw.—WM. MANSBRIDGE, Liverpool.

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The name of Dr. Francis Darwin, F.R.S., appears in the list of New Year's Honours. He has received a knighthood.

MYCOLOGICAL MEETING AT SANDSEND.

C. CROSSLAND,
Halifax.

(PLATE I.).

THE Twenty-fourth Annual Mycological meeting was held at Sandsend, near Whitby, September 28th to October 3rd; permission to look through Mulgrave woods, parks and pastures having again been very kindly granted by the Rev. the Marquis of Normanby. We are also once more much indebted to the Rev. W. G. Harland for allowing us the use of the schoolrooms at Sandsend, Monday to Wednesday. The President and seventeen members of the Union, including all the Mycological Committee, with the exception of Mr. J. W. H. Johnson, attended. There were also Miss Ivy Massee, Kew, and Mr. Sharples, formerly of Burnley, recently appointed to a Government Mycological post in Malay.

Mr. and Miss Massee, Mr. Clarke, Mr. Sharples, and one or two other friends arrived on the Friday, and on Saturday had a fine, full day in the woods and pastures. They made up some good baskets, among the specimens being several species of more than ordinary interest, which were shown to the new arrivals on Saturday afternoon.

Mr. Massee's address on 'Mycology, New and Old,' a short abstract of which appeared in the December issue, pp. 366-7, was given in the evening. Rather than overcrowd the opening night, Mr. Clarke agreed to hold over his paper on 'The Genus *Tricholoma*,' to another day; see *loc. cit.* pp. 364-5.

Monday was wet, and acted as a deterrent to collecting, yet a few of the younger members ventured into the woods while the older kept inside and worked out the material already gathered.

Mr. Wager's paper on 'The Sexuality of the Fungi,' illustrated by the lantern was given in the evening. For short abstract, see *The Naturalist*, November, p. 328; and for abstract of Mr. Mason's paper entitled 'Some notes on the Yeast Fungi,' see pp. 13-16 hereof.

Mr. A. E. Peck, Scarborough, an adept in the art of fungus and other photography, threw on the screen about 150 slides, mostly representing agarics. Their finish is all that can be desired in black and white. It was however, suggested to Mr. Peck that the addition of sections showing the thickness, or thinness of the flesh of the pileus, thickness and substance of stem, depth of gill and its attachment to, or freeness from, the stem, would greatly add to the scientific value of the slides.

On Tuesday, Mr. Cheesman discoursed on 'The Capillitium of the Mycetozoa,' aided by a series of large diagrams illustrating

some of the leading types. A general description of these minute borderland organisms, including their various structures, habitat, food, mode of life, formation of sporangia, etc., was given. In describing various forms of capillitia it was pointed out that in many genera this structure is profuse, as in *Stemonitis*, *Comatricha*, *Trichia*, *Arcyria*, etc.; in *Perichaena* it is scanty; while in *Cribraria* and *Dictydium* it is absent. The capillitium and spores are the principal factors in classification. In some genera the lime granules secreted by the plasmodium are deposited in swellings of the capillitium threads, in others as crystals on the outer surface of the sporangial wall. Mr. Cheesman remarked that a knowledge of the various forms of Capillitia was important to the student, and urged that this group offers charms to the naturalist unsurpassed by any other group of organisms.

As the week wore on, the fact became more and more apparent that the crop of agarics was much below the average. One would think an abundant crop would follow the plentiful rainfall of last 'summer,' but that does not always follow. The weather throughout has been too cold to induce the development of this class of plant. What the mycelium or spawn requires, as every mushroom grower knows, is heat as well as moisture. This season there has been an almost entire absence of the usual summer temperature. The ground has rarely seen the sun in the north here, consequently has never been really warmed. But whatever kind of meteorological conditions prevail they are not suitable to all fungi alike. *Tricholoma personatum*, a good edible species commonly known as blewits, blue stalks, etc., was noticed growing in a ring at least ten yards diameter, on Sandsend Rigg.

The erratic appearance of agarics, even in ordinary seasons, does not warrant comparisons, yet a few may be made between the number of certain genera previously recorded for this district, and the number noticed this time:—

	Previously recorded.	Seen this time.		Previously recorded.	Seen this time.
<i>Amanita</i>	5	.. 2	<i>Cortinarius</i>	40	.. 10
<i>Lepiota</i>	10	.. 3	<i>Flammula</i>	7	.. 1
<i>Tricholoma</i>	41	.. 11	<i>Hebeloma</i>	9	.. 2
<i>Pluteus</i>	6	.. 1	<i>Naucoria</i>	7	.. 2
<i>Entoloma</i>	10	.. 1	<i>Inocybe</i>	24	.. 6
<i>Leptonia</i>	5	.. 0			

What is perhaps the most peculiar in the latter case is that of the six gathered this season, two are new to Yorkshire, one of them being new to Britain—*Inocybe violaceifolia*, see plate I, figs. 1-3. This was first found in the United States. The comparative sparseness in the appearance of agarics this season, as indicated in the above table, applies to several other

genus, but a remarkable exception may be given. The genus *Mycena* was represented by 15 out of a previous 40 already recorded, but besides the 15, seven others of this well defined and graceful group were discovered, all of which are additions to the flora of Mulgrave Woods; four being new to Britain, and three to Yorkshire; see below.

One of the charms of field mycology is its uncertainties. The appearance of fungi is so uncertain that more surprises fall to the lot of a field mycologist than to most other outdoor students of nature. Of course, many fungi are always with us in their season, but even these may appear in abundance one season and sparingly another. We have yet to discover why this should be so; there must be some influence at work to bring about these phenomena, either in the fungus itself or its habitat. Doubtless many move their quarters when the pabulum upon which they have been living becomes exhausted so far as they are concerned, or they die down from other causes. Their shed spores can be easily spirited away by air currents, or carried by insects, or other agencies, to new localities. When we consider the millions upon millions of spores a single toadstool, puff-ball, or other fungus produces, we can easily imagine the numerous chances they have of becoming established in fresh places, far or near; further, each one of these vast multitudes of spores, although some are only about $\frac{1}{60000}$ of an inch or less longest diameter, is endowed with its speck of life when shed from its parent, enabling it, under suitable conditions, to reproduce its kind. The spores, or the mycelium they give rise to, may lie dormant a season or two, or the latter may continue to grow several years, spreading unseen beneath the surface of the ground, or inside dead wood, or among rotting leaf mould, and when a suitable time comes round, the mycelium (the real plant) puts forth its fruits, in the shape of toadstools, puff-balls, and other forms according to their race, occasionally in great abundance a season or two, then die down at that particular place. We have seen prolific erratic crops of this kind both in Mulgrave Woods and other places; the following come to mind at the moment—*Hygrophorus cossus*, *Eccilia atropuncta*, *Lactarius deliciosus*, *Mitrula violacea* and *Humaria subhirsuta*. A remark on the latter, taken from the Yorkshire Fungus Flora, p. 260, may be quoted:—‘Elland Park Wood (Halifax), May, 1896, in great quantity; a patch of ground three or four yards in extent was so covered with the multitude of ascophores as to appear an almost unbroken bed of yellow. In 1897 the fungus was only sparingly scattered at the same spot, and during 1898-9 disappeared altogether.’ In the meantime not the slightest discernible change in the conditions of the spot had taken place.

A perusal of mycological records reveals the fact that

numerous forms have been met with only once, still other novelties continue to crop up. *Russula virginea* Cke. and Mass. was found here last year and again this, in plenty; previous to last year it had only been recorded for Windsor Forest where it was first found. These constant additions to previous records justify continued research in one and the same locality, and by being permitted to look through one series of woodlands a few seasons in succession very much better scientific results are obtained.

Of the ten species found here in 1912, new to the British Flora, four are figured on plate I. The fifth, *Agaricus bernardii* Quel. is from Cullingworth, near Keighley, discovered and brought to Sandsend, by Thos. Hebden.

The following are the descriptions:—

Mycena seynii (Quel.) Mass. Eur. Agar. (1902), p. 36; *Agaricus* (*Mycena*) *seynii* Quel. Bot. Soc., France (1878), t. 2, f. 9; Cla. Syn. Hym., Cke. and Quel. (1878), p. 36.

'*Pileus* vinous, shining; gills rosy-lilac; stem fistulose, hyaline, purplish, base hairy, white.'

Hab. On rotting leaves. Plate I., figs. 7-8*.

Mycena nivea (Quel.) Mass. Eur. Agar. (1902), p. 39; *Agaricus* (*Mycena*) *niveus* Quel. Bot. Soc. France, (1878), t. 2, f. 1; Cla. Syn. Hym., Cke. and Quel. (1878), p. 36.

'*Pileus* sulcate, shining white, diaphanous; gills uncinat; stem pruinose, base rather swollen, fibrillose.' Figs. 9-11.

Inocybe violaceifolia Sacc. Syl. IX., p. 98; *Ag.* (*Ino.*) *violaceifolia*, Peck. 41. Rep. N.Y. State Museum, p. 66; Mass. Mon. *Inocybe*, Anns. Bot. Vol. 13 (July, 1904), p. 482.

'*Pileus* convex or almost plane, fibrillose, sub-squamulose, grey, 1-1.5 cm.; gills crowded, adnexed, pale violet, then brownish cinnamon; stem firm, solid, slender, fibrillose, whitish, 2.5 cm. long; spores smooth, elliptical, $10 \times 6.5\mu$, cystidia ventricose, $50-60 \times 12-16\mu$, fairly numerous.'

Hab. On the ground among moss. This species was first found in the United States. Figs. 1-3.

Hygrophorus persicinus Beck; Mass. Eur. Agar. (1902), p. 72.

'*Pileus* conical then hemispherical, margin incurved, peach colour or somewhat orange, shining, even; gills thick, both ends narrowed, decurrent, edge very obtuse, fuscous; stem constricted below gills, pale lilac-peach colour, base yellowish; spores $15-20 \times 5-6\mu$.'

Hab. On the ground among short, scanty grass in woodland. Figs. 4-6.

Agaricus bernardii Quel., Cla. Syn. Hym. Cooke and Quelet (1878), p. 89; Mass. Eur. Agar. (1902), p. 205.

'*Pileus* compact, white, tomentose under a lens, 10-20 cm. across, convex, then expanded, cracked into areolae, greyish white; stem solid, stout, ovate, striate at the apex, ring mem-

branous, striate above; gills free, greyish pink then bay brown; flesh white, becoming purplish, then brownish when broken; spores subglobose, 8 μ .

Hab. In pasture, Cullingworth, near Keighley, September, 1912, Thos. Hebden. In this specimen the spores were rather pale, subglobose with an oblique apiculus, 7-9 μ . Figs. 12-14.

The remaining new British things gathered at Mulgrave are:—*Mycena simillima* Karst., *Mycena chlorantha* Fr., *Panus farinaceus* Schum., Type, *Tomentella ferruginea* Schroet., *Corticium confine* Bourd., *Diaporthe (Tetrastaga) insignis* Fckl., *Melanomma (Trematosphaeria) paradoxa* Winter, descriptions of all of which will be given in the next article on 'Recently discovered Fungi in Yorkshire, VI.' which we hope will appear next March or April. The two last were found at the Spring meeting.

A five days' visit by the Committee, including Mr. and Miss Massee, was made May 18th—23rd. On account of its being the height of the game breeding season we could only enter the Woods Saturday, Monday, and Wednesday three of the days open to the general public, and then, of necessity, we confined ourselves pretty well to footpaths. There is a bit of good ground outside the lodge gates in East Row we investigated fairly well. The gathering of fallen twigs, bits of dead branches, and chips, in the search for pyrenomycetes and other microscopic fungi, was one of our chief aims.

A comparison of the Spring and Autumn additions will show that the former are principally composed of Uredines, Pyrenomycetes, and other micro-species, making the fact very evident that a Spring meeting is absolutely necessary if we are to get a clear 'all round' knowledge of the mycological flora. Agarics and other large fungi are almost entirely absent during the earlier months of the year, while December to April are the best for Pyrenomycetes, and May for Spring fungi generally.

The occurrence of the lovely cream and scarlet fairy-cup—*Geopyxis coccinea* of early Spring, already recorded on the authority of the head woodman, was confirmed at the Autumn meeting by the finding of a premature specimen.

The useful and suggestive paper on the Pyrenomycetes communicated by Sir H. C. Hawley was read by the Secretary. An abstract appears in the November issue, pp. 341-3. Sir Henry, who is specialising on this group, attended the spring meeting and gathered material that yielded 41 species of this class, 16 of which proved to be additions to previous Mulgrave records, six being new to Yorkshire, and two to Britain. Further additions were made in autumn, for which see list.

Eleven species of *Clavaria* were brought in; all being forwarded to Mr. A. D. Cotton, Kew, for special examination.

Four are among the additions for here. A stranger is held over for further consideration.

A collection belonging to the order Thelephoraceae was sent to Miss Elsie M. Wakefield, Kew. Miss Wakefield is devoting special attention to this not over well-known group.

Clitocybe Sadleri Berk., Cooke's Illustr., p. 127. Specimens of this so-called species were found at the base of a stump at Sandsend. At first sight it had every appearance of a *Clitocybe*, and according to Cooke's figure, *C. Sadleri*, but its few spores were found to have a tinge of purple; other features connected with it left no doubt as to its being an abnormal form of *Hypholoma fasciculare*. The tuft first-named *C. Sadleri* was found on an oak tub in a conservatory at Edinburgh by Mr. John Sadler, whose name was given to the agaric by Berkeley under the impression that it was a normal, white spored species. Several mycologists have doubted its being a good species (Mass. Brit. Fung. Flo. II, pp. 441-2), now it is clearly proved it is not.

On summing up the results for the year it was found that 107 additional species had been registered for the district—50 at the spring meeting, and 57 in autumn; no fewer than 10 being additions to the British and 34 to the Yorkshire Mycological Flora, (see the accompanying lists). A few others are awaiting further consideration. The total now reached is 1,207, or thereabouts. In the following lists of this year's additions, those new to this country are marked *†; those to the county †.

Lord Normanby was cordially thanked for his great kindness in allowing the Mycological members of the Union to investigate his extensive woodlands a few seasons in succession in autumn; also the Rev. W. G. Harland for permitting us to use the schoolrooms at Sandsend, Monday to Wednesday.

A few days' meeting in May, 3rd—8th, at Sandsend, was decided upon, and the Union was recommended to ask his Lordship once more to grant permission to visit his woodlands, September 20th—25th, 1913.

Miss Massee brought to the meeting a large series of beautifully executed drawings of both fungi and flowering plants, which were much admired; and Mr. Massee, a useful series of *Boletus* drawings, one of which enabled Mr. Clarke and myself to identify one of this group hitherto a puzzle to us. Mr. Gibbs and the writer each contributed a fascicle of miscellaneous coloured figures of fungi. Besides his series of coloured *Tricholoma* drawings prepared to illustrate his paper, Mr. Clarke had a set representing the mushroom family, displayed on the schoolroom walls.

Miss Massee, besides being most active in the field collecting, deftly applied her pencils and paints when indoors and succeeded

in painting in all detail no fewer than twelve species, including six of those new to Britian, five of which appear on the plate.

Officers and Committee for 1913, as last year with the exception of the late Mr. R. H. Philip, whose recent loss by death is very much deplored.

The additions made at the two meetings are as follow:—

MAY 1912.

- Polystictus velutinus*. On stump.
† *Poria hymenocystis*. On decaying wood.
† *Corticium evolvens*. On bark of fallen branches.
† *Femsjonsia luteoalba*. On fallen branches.
-
- Uromyces ficaria*. On *Ran. ficaria*. A few leaves were attacked by both this fungus and *U. poae*.
U. scillarum. On *Scilla nutans*.
Puccinia pulverulenta. On *Epilobium hirsutum*.
P. pruni. On *Prunus domesticus*, Sept., 1911.
P. fusca. On leaves of *Anemone nemorosa*.
P. chrysosplenii. On leaves of *Chrysosplenium alternifolium*.
P. valantiae. On *Galium cruciatum*.
Phragmidium fragariastrum. On *Potentilla fragariastrum*.
-
- Hypoxylon serpens*. On decaying stump.
Phyllachora ulmi. On living leaves of *Ulmus*.
P. junci. On living *Juncus* stems.
Dothidea ribesia. On living *Ribes* stems.
Valsa salicis = *Diaporthe salicella*. On dead willow twigs.
Diaporthe ambiens = *Valsa ambiens*. On wych-elm and apple.
*† *D. insignis*. On bramble.
D. scobina. On ash twigs.
† *D. crustosa*. On holly twigs.
Psilosphearia minima Cke. = *Wal. rothiella* (Fckl.) Sacc. On dead branch.
† *P. pomiformis* (Pers.) = *Melanosamma pomiformis*.
*† *Melanomma* (*Trematosphaeria*) *paradoxa* Wint.
-
- † *Strickeria obducens* (Fr.) Wint. On dead wood.
† *Amphisphaeria umbrina* (Fr.). D. Not.
† *Gnomonia cerastis* Reis. On leaves and petioles of sycamore.
† *Physalospora* (*Ditopella*) *fusispora*. D. Not. On alder.
Leptosphaeria vagabunda Sacc. = *Sphaeria fuscella* Sacc. *Mycol. Ven.* On previous year's twigs of *Ribes grossularia*.
-
- Dasyscypha calycina*. On living and dead larch twigs, fortunately only sparingly.
D. leucophaea. On dead herbaceous tems.
D. sulpharea. On dead herbaceous stems.
Tapesia fusca. On decaying wood.
Ciboria amentacea. On decaying alder-catkins.
Helotium claroflavum. On decaying moss-grown branches.
Mollisia atrata. On decaying thistles.
Pseudopezia petiolaris. On petioles of shed leaves of horse-chestnut.
Calloria fusarioides. On dead nettle-stem.
† *Karschia lignyota*. On decorticated branch.
-
- Peronospora ficariae*. On leaves of *Ran. ficaria*.
P. candida. On *Primula officinalis*.
Synchytrium anemones. On living leaves of *Anemone nemorosa*.
S. mercurialis. On living leaves and stems of *Mercurialis perennis*.
-
- Rhinotrichum niveum*. On rotten wood.

† *Clasterosporium opacum*. On
decaying wood.
Brachysporium tingens. On de-
caying wood.

† *Physarum straminipes* List.
† *Badhamia populina* List. On
cast poplar bark.

SEPT. 28th—OCT. 3rd.

Geaster fimbriatus.
Collybia conigena. On fir cones.
C. succinea. Among grass.
† *Mycena rubromarginata*.
*† *M. seynii*.
*† *M. chlorantha*. Among moss.
M. luteoalba.
† *M. nivea*.
*† *M. simillima*.
† *M. collarata*.
Clitocybe tumulosa.
Pleurotus ulmarius. On elm log.
P. serotinus.
*† *Inocybe violaceifolia*.
† *I. sindonia*.
† *Naucoria triscopoda*.
Cortinarius (Tela.) brunneofulvus.
C. (Tela.) glandicolor.
Agaricus campestris.
var. *pratensis*. In pastures.
Stropharia squamosa.
var. *thrausta*.
*† *Hygrophorus persicinus*. Among
grass in woodland.
H. olivaceoalbus.
H. leporinus.
Russula subfætens.
R. fragilis, var. *fallax*.
Lentinus lepideus.
*† *Panus farinaceus* type.
Fomes resupinatus.
Hydnum stevensoni.
† *Corticium læve*.
C. lactescens.
*† *Corticium confine*.
*† *Tomentella ferruginea*.
Pentophora velutina.
P. incarnata.
The preceding seven on de-

caying decorticated wood or
on chips.
Thelephora biennis.
Clavaria luteoalba.
C. acuta.
C. straminea.
The last three on the ground.
C. funcea. On wet decaying
leaves, etc.
Auricularia mesenterica.
Puccinia veronicæ. On *Veronica*
montana.
† *Dialonectria (Calonectria) Plow-*
rightiana Sacc. On dead bur-
dock.
Phyllachora ulmi. On living
ulmus leaves.
Lophiostoma caulium. On dead
Epilobium hirsutum.
Lophiodesmium pinastri. On
dead pine-leaves.
† *Hysterium angustatum*.
† *Mitrella viride*. On bare bank
under beech tree.
Dasyscypha patula. On dead oak
leaves.
Phoma rusci. On dead leaves of
Ruscus.
Ptychogaster alba.
† *Graphium grovei*. On decorti-
cated branch.
Fusicladium dendriticum. On
apples.
Stemonitis flavogenita.
Brefeldia maximus.
Trichia contorta.
Craterium leucocephalum.
Badhamia panicea.
B. varia = *B. utricularis*.

KEY TO FIGURES ON PLATE I.

Fig.
1—*Inocybe violaceifolia* Sacc. Nat.
size.
2—Section of same. Nat. size.
3—Spores of same. × 400.
4—*Hygrophorus persicinus* Beck.
Nat. size.
5—Section of same. Nat. size.
6—Spores of same. × 400.
7—*Mycena seynii* Quel. Nat. size.

Fig.
8—Section of same. Nat. size.
*8—Spores of same. × 400.
9—*Mycena nivea* Quel. Nat. size.
10—Section of same. × 3.
11—Spores of same. × 400.
12—*Agaricus bernardii* Quel. Nat.
size.
13—Section of same. Nat. size.
14—Spores of same. × 400.

Nos. 1 to 11 from Mulgrave Woods; 12-14 from Cullingworth.

Naturalist,

THE ORCHIDS OF THE UPPER HODDER VALLEY.

M. N. PEEL,
Knowlsmere Manor.

To the following observations on the variation and distribution of the orchidaceous plants of Upper Hodder is added a description of the three forms assumed by *Orchis incarnata* and its supposed hybrid with *O. maculata (recurva)*. As far as the specimens obtained in the neighbourhood in question are concerned it would appear that no hard and fast line of demarcation can be drawn between the two species, but that under favourable conditions they will hybridise, producing intermediate forms.

I am indebted to Mr. F. Arnold Lees for his notes on some of the specimens.

ORCHIS MASCULA. Very common. In Knowl Hill Wood (limestone and very dry) the plants are extremely fine, the spikes reaching six inches in length.

ORCHIS INCARNATA. Flowers in mid-July. Of this there are three forms (numbered 1, 2 and 3 respectively).

No. 1 occurs in three localities; (1) a bog on Ashnott Farm; limestone about 700 ft., with Nos. 2 and 3 and *O. maculata*. (2) a ditch on Gawker Farm, Yoredale or glacial drift, about 500 ft., by itself. (3) A bog on Slimro Farm, same subsoil as the last; about 550 ft., with No. 2. Stem about 11 inches, stout, straight, stiff, hollow, brownish below the spike; spike 1—2 inches, compact, even; bracts brownish, three veined, longer than the twisted ovary; flower, rose or dull pink, variegated darker; sepals narrow, reflexed as in *O. maculata*; tip not lobed, slightly compressed laterally; spur stout, shorter than the ovary. Leaves four or five, green, unspotted sheathing, lanceolate, tapering pointed, concave, concave at tip. Tip of second leaf (and sometimes also of the third leaf) reaching to the summit of the spike, first leaf shorter. This varies with the first leaf short and bract-like, hardly sheathing.

FORM No. 2. Occurs in the three following localities: (1) Ashnott Bog with No. 1. plentifully (see above); (2) Slimro Bog, two or three plants also with No. 1; (3) a ditch on Foulscates Farm (Yoredale, about 500 ft.) with No. 3.

It is taller than No. 1, spike longer, flowers the exact colour of dark *O. maculata (recurva)*; lip more compressed than in No. 1; leaves reaching the base of the spike only; varying smaller and less robust. In the specimens from Foulscates the leaves are wider, longer and stouter, reaching the summit of the spike, with a bractlike first leaf.

FORM No. 3. The Hybrid? Ashnott Bog and Foulscates ditch.

More slender, taller, and less stiff than the preceding; stem solid, sometimes brown below the spike; spike up to three inches; bracts less conspicuous and shorter; flowers the colour of No. 2; sepals spreading; lip 3, lobed hardly or not at all compressed; leaves green, unspotted, tapering, pointed, sheathing, hardly concave, flat at tips, waved; in some reaching the base of the spike, in others shorter; varying with slightly spotted leaves. [I think so: there can of course only be crossing between cheek-by-jowl growths; and as there is no *eu latifolia* it must be with one of the two—*Gymnadenia* is an orchis—which there is on the site.—F.A.L.]

No *Gymnadenia* was present in either locality when the above-named specimens were gathered in July, 1912.

[NOTE.—In answer to a question, 'Why *Orchis incarnata* B. & H. should flower so late and (possibly) hybridise with *O. maculata*?' the only answer must be the accident of site and elevation and all-powerful opportunity. But the relations of date don't hold good for all England even. In the 1862 Edition of Babington's Manual, the Cambridge Professor wrote of *incarnata* as 'mostly quite past flowering when *latifolia* is in perfection in the middle of June.' But what true broad-leaved *majalis* Wats. we have, on the limestone slopes and terraces of Teesdale, etc., is climatically compelled to defer its floriation well into June, at least in my experience, but it is sporadically rare and, not dominant, in suitable mires and slacks, as is *incarnata*.—F.A.L.]

{ ORCHIS MACULATA }	Very common, growing in dry places, in bogs and in woods.
{ O. RECURVA. }	Sometimes the ground colour is almost pure white.

[*O. recurva* Nyman is *O. maculata* L. without its *O. praecox* Webster (which is the earlier name for *O. ericetorum*). *O. recurva* has a sub-equal tri-dentate lip; the germen twists in maturation of individual flower until the lip stands uppermost; leaves maculate infolding, sinuously recurving.—F.A.L.]

{ ORCHIS MACULATA }	Uncommon. Ashnott bog, some little distance from hybrid No. 3. A
{ O. ERICETORUM. }	few plants mid. July, 1912, all in a more advanced stage of floriation than <i>O. recurva</i> , <i>O. incarnata</i> , or hybrid No. 3.

[*O. ericetorum* Linton (*praecox* Webster) the flowers are paler, often white; lip emarginately rounded with faint anastomosing lines. Both races or forms of the old aggregate *O. maculata* Linn. will hybridise with *G. conopsea* as well as *O. incarnata*. The products mostly want names

but the difficulty is to satisfactorily make out the exact alliance.—F.A.L.].

GYMNADENIA CONOPSEA. (a) In hayfields, mostly on limestone; spike and stem short; flowers sometimes pure white; flowers June—early July.

(b) In bogs, taller and finer; spike reaching six inches or more in length; flowers larger, horizontal, then tilted sideways, purple pink; sepals spreading; petals converging; lip with three blunt even lobes, unspotted; spur very long and slender, curved; bracts as long as the ovary inconspicuous; upper leaves bractlike; lower increasing in size, lanceolate, unspotted, straight, concave; concave at tips. [This cross-pollinates with any other swamp pasture orchis there may be.—F.A.L.]

Both forms are sweet-scented.

GYMNADENIA ALBIDA. July, 1912. Two localities only. (1) limestone hayfield, dry, with *H. chlorantha* and *G. conopsea* form (a) Eight plants.

(2) Sandstone, hayfield, wet, with *H. chlorantha* and *O. recurva*. Two plants. Of one of these Mr. Lees writes, 'The largest specimen I ever saw, and perfectly distinctive.'

[The grand ascertained fact, of recent proof, is that close allies will hybridise (more or less efficiently marry), through the agency of insects, and afford us a not inexact parallel to the alliances of the human race. . . . *G. conopsea* is known to cross-pollen with *G. albida* and *Hab. viridis*, and I think it not unlikely that another year this hybrid, *G. Schweinfurthii* Heg. may be found in Bowland as in Scotland. The full germen'd specimens sent, seem to hint at pure breed, or only just enough refreshing stimulus to strengthen the strain of vegetative vigour.—F.A.L.]

HABENARIA VIRIDIS. One locality only, and there very scarce. A dry limestone pasture near Newton, in 1911 and 1912. Previously found by the Rev. Wm. Crombie.

HABENARIA BIFOLIA. A damp meadow on Yoredale about 600 ft. One plant only, 1912. Differs from the next in the smaller size, smaller and greener flowers, straighter spur, more narrow sepals, parallel anther cells and more compact and even spike.

HABENARIA CHLORANTHA. In three localities (a) on limestone, dry, fairly plentiful; (b) on Yoredale, damp, rare; (c) sandstone, damp, uncommon.

LISTERA CORDATA. Bog on Waddington Fell, 1,100 ft.

LISTERA OVATA. Very common; often extremely fine.

EPIPACTIS PALUSTRIS. One locality only, a bog on limestone (or a glacial clay containing many limestone boulders), about 450 ft. with *Menyanthes* and *G. conopsea*.

[EPIPACTIS 'LATIFOLIA.' I have an old note for this in Gibbs' Wood, but it was almost certainly the next].

EPIPACTIS VIOLACEA (or *media*, *atro-viridis*). (See article on the Helleborines by Mr. F. Arnold Lees in *The Naturalist*, March, 1910). Grows in three colonies in Gibbs' and Ashnot Woods on Yoredale and Limestone. Is troubled by insects but holds its own. Flowers late July. *Most of this wood was planted during 1809 or 1810.* [Brought with young trees, I think.—F.A.L.]

—: O :—

The Home Life of the Terns. By **W. Bickerton, M.B.O.U.** London: Witherby & Co., 88 pp., 32 plates, 6s. net.

Mr. Bickerton has written an extremely interesting account of the habits of the five species of British breeding Terns, which as far as the localities in which he has worked, the writer can testify is very accurate. The author's experience has, however, been limited to two localities, the first the well known Cumberland resort, Ravenglass; the second not named, but easily recognisable. Unfortunately it is impossible to make definite statements with regard to any particular species by the experience gained in one breeding haunt, as environment no doubt alters the habits of birds to some extent. With regard especially to the Sandwich Terns, the birds on the Farnes are later in nesting than at Ravenglass and when they have finished their home duties at the latter place there are still many eggs or newly hatched young on the Farnes. The Author states also that this species does not choose to nest altogether in one particular spot, nor in one continuous area. This is certainly the case at Ravenglass, but on the Farnes they nest in two large colonies, as they do in one or two places in Holland. (He falls into a similar error with regard to the Lesser Tern, though quite correct as regards Ravenglass, does not apply to other haunts). It is interesting to note that he has never seen a nest containing more than two eggs. It is certainly unusual to see more, but I have photographed one at Ravenglass containing three and have several times seen them with three eggs on the Farnes. It is somewhat curious that the watcher at Ravenglass considers that the light coloured young ones are hatched from light coloured shells and dark young ones from dark coloured shells, as this is the belief of Darling, the watcher on the Farnes. The author does not mention the fact that a nest frequently contains a young one of each shade. In dealing with the Arctic Tern, mention is made that in the particular haunt referred to there are many birds with white on the head, showing immaturity. It is rather strange that with his experience at Ravenglass, he has not noticed that the Sandwich Terns have, towards the end of the nesting season, but while still incubating, a considerable amount of white on the forehead, showing that they are assuming winter plumage before their domestic duties are finished. The author falls into a fault possessed by many bird photographers, in assuming that he is the first to photograph a particular species. In Mr. Bickerton's case, this I am perfectly sure is not intentional. The Roseate Tern was photographed on its nest long before the time he names, and I have photographs of both birds, nests and young. Mr. Bickerton's experience with the Roseate is confined to eight nests and he concludes that they only lay one egg. I have seen many nests. One resort I know of will contain, I should say, about 50 pairs of birds, but the nests coming under my own observation have practically always had 2 eggs. There are many more matters one would like to touch upon did space permit. The illustrations, as might be expected by anyone who knows the author's skill, are exceedingly fine and in practically every case excellently reproduced. The book can be thoroughly recommended as a careful and reliable account of the habits of the birds in the two particular haunts in which he has worked.—R. F.

NOTES ON THE NATURAL HISTORY OF HORNSEA MERE.

GEORGE BOLAM.

I WENT to Hornsea Mere on 20th April, 1912, on behalf of the Yorkshire Naturalists' Union Wild Birds' and Eggs' Protection Committee, and remained till 20th July, finding lodgings at the East Lodge, Wassand, which is the most convenient end of the Mere for observation. The following notes on the Natural History of the Mere may, it is hoped, be useful to future workers; but they are only the first impressions of a stranger to the district, and must not be regarded as anything more, nor as in any way exhaustive of the subject.

The water of the Mere covers about 470 acres. Its surface is only about twelve feet above sea level, and nowhere is it deeper than ten or twelve feet. Its bottom is, in many places, covered by a considerable accumulation of soft mud, but here and there it is hard, stony, and 'clean'; its ridges and islands being glacial deposits, in every way similar to those on the adjoining land. In several places round its margin there are large solitary boulders, chiefly of granite, or porphyry, and many smaller ones. Over the muddy parts Fresh-Water Mussels (*Anodonta cygnæa*) are numerous and of large size; other fresh-water molluscs are also abundant.

There are extensive beds of Reeds (*Arundo phragmites*), particularly at the upper end, varied by large 'fields' of Reed Grass, or Manna Grass (*Glyceria aquatica*), Bullrushes (*Typha latifolia*), and two or three of the common coarse Sedges. Up till recently, these beds were extensively cut and used as straw for horses, etc.,—'Flagging' being the collective name given to the litter in the locality—but the practice has been almost wholly discontinued during the last year or two by Captain Constable, in the interests of the birds. Outside these beds there are considerable extents of Bog Bean, Equisetum, Iris, Potamogeton, and Yellow Water Lily (a few plants of the white *Nymphæa alba* lately introduced in the bay behind the Lady Island are doing well, but have not yet spread), with many stately clumps of Great Water Dock and other lacustrine plants. In the ditches, Water Violet (*Hottonia palustris*), Arrow Head (*Sagittaria*), and Bladderwort (*Utricularia vulgaris*) are common, and large corners are filled with tall growths of Hairy Willow-herb, *Holcus*, and other rank-growing plants. In the Low Wood, which, since the heightening of the water in the Mere, has become largely an almost impenetrable morass, trees and herbs are tied together with a tangle of Woody Nightshade; ditches are bordered with tall Canary Grass (*Phalaris*

arundinacea), and the monotony of the dense beds of Reeds and Reed Grass is varied by a little Skull-cap (*Scutellaria galericulata*), Gipsy-wort (*Lycopus*), Great Spearwort, Marsh Figwort, Milk Parsley (*Peucedanum palustre*), and *Sium latifolium*, some of them being forced up to an unusual height in order to reach the light amongst their tall companions. Round the landward sides of the Mere some of the botanical features are the profusion of Spotted and Marsh-Orchis (*O. mascula* and *latifolia*), Meadow Rue, Valerians (*V. dioica* and *officinalis*), *Lychnis flos-cuculi*, Ragworts (here called 'Segrams'), Creeping Jenny (*Lysimachia nummularia*), and Lady's Smock. In the woods, Enchanter's Nightshade, and Tway-blade are much in evidence, and *Epipactus latifolia* was noticed.

The Reeds are of unusually strong growth, some of those near the Round House being measured last year and found to exceed 14 feet in height, while this season they promise to be even taller.

I suppose 1912 will be long remembered as a bad season. When I arrived at Wassand much of the land was so dry and hard that the farmers could not plough it, nor get their corn sown; while after the rains started they were so continuous that it left agriculture in little better plight. Some oats were not sown till well on in May; many bean fields had to be ploughed up as useless from 'blight'; and up to 20th July farmers were still trying to sow turnips, and most of the hay was out, much of it uncut.

Up to the middle of May the weather remained dry, and, though it was cold, birds did fairly well. On 22nd May, rain and floods began, and it continued wet throughout the remainder of the season. As some record of this may be of interest, as well to illustrate my remarks as for future reference, a copy of a summary of his records at Sigglethorne (only a mile or so west of the Mere), kindly supplied to me by Captain Bethell, R.N., will be appended. As more particularly remarked upon under the headings of the various birds, we had many nests, especially of water-fowl, drowned by the floods and storm of 22nd to 24th May, floods which were repeated at short intervals afterwards, though most of the harm to wild birds was then already done.

The level of the water in the Mere is regulated by a sluice at Hornsea, the key to the gates of which is kept by Mr. Holmes at his boating establishment, as agent for and on behalf of Captain Constable, the sole owner of the Mere. The sluice-gates are seventeen inches high, so that, when they are closed, the water in the Mere can be raised by that amount. Of late years they have been, for the most part, kept closed, the owner of Wassand preferring to have the water-level high.

This, in itself, probably makes no great difference to the birds, provided no floods intervene; but when a dry spring is followed by a wet summer the bad effect is obvious; though of course the same conditions would obtain—only slightly less aggravated—if the gates were not there and the water (in a dry spring) fell much below the outlet. In either case the level of the Mere must rise after rain until the water is able to escape over the outlet, and it only becomes a question of how far below the outlet the water falls, and, therefore, how much it must rise again before it can escape.

When I first saw the outlet, the sluice gates were closed, and had been for long past, but owing to the very dry spring the water had dwindled (by evaporation and other natural causes) until it had fallen below the level of the outlet, so that at this time there was no overflow, and before there could be any it was necessary that the level of the Mere should rise at least 17 inches, unless the gates were opened. When it is remembered that under these conditions, and at the then level of the water, most of the birds made their nests, it will be readily understood how, when the rains came, so many of the nests were flooded.

As a matter of fact the water in the Mere rose during the 22nd and 23rd May, more than 5 inches. Later floods were as great—perhaps even greater—but to confine oneself to the first will be sufficient. Had the sluice gates remained closed the water must have risen other 12 inches before it began to escape over the top of the gates, which would have meant wholesale destruction to the nests; but on the 23rd I got Mr. Holmes to open one gate and this had the effect of checking any further serious rise during that flood.* When the Mere is low, and the weather warm—and when as a natural contingent there is little inflow—evaporation alone will sometimes absorb more water than comes in, and the level of the Mere is then liable—as happened last year—to be lowered considerably below the outlet—*i.e.*, below even the bottom of the sluice-gates. If nests were built under such conditions, and a flood came, there would be no possibility of saving such of them as were below, or nearly equal with the level of the natural outlet.

With the sluice-gates in operation, the position is somewhat modified, and *in the interests of the birds alone* some such treatment as the following might be suggested; it being only necessary to remark that there may be, and possibly are, other and weightier interests to consider. The best course would be to keep the water up to the level of the *top* of the sluice-gates in

* Mr. Holmes informed me that when both gates are open—and with a normal inflow of water—the level of the Mere can be reduced one inch in the course of 24 hours.

spring, whenever possible. When it is in that condition there is no great chance of the Mere becoming flooded to any appreciable or harmful extent, as it has then a natural overflow in full working order. Should the water fall, however, during the latter part of April, or May, say more than a couple of inches below the top of the sluices (the outflow having then, of course, ceased) great care should be exercised to ensure that, as far as possible, no further rise be permitted, say before the end of June; to avoid this either one or both gates being opened as far as necessary in the event of heavy rain coming.

If careful attention was paid to this point, the rise, or fall, of the water could thus be controlled to the extent of the height of the sluice-gates—17 inches—which should, in any average year, be an ample margin. Of course it assumes two important conditions; first that the April level of the Mere can be got up to the 17 inch level, and secondly that there is a reasonable chance of maintaining it for a month or two somewhere between that point and the bottom of the gates—17 inches lower. Should the water, despite all precautions, fall below that point, of course it gets out of control, and all that can then be done is to set the gates open and keep them so during the remainder of the nesting season, ready to allow a free overflow as soon as the water rises up to them.

In this way any serious summer flood could be made reasonably unlikely, if it could not be altogether prevented. Had it been followed this year it would have prevented the unfortunate drowning of nests which took place in May.

Of serious human poaching on the Mere I am glad to be able to report that there was this year practically none. The local people understand pretty well that the place is preserved and looked after, and from the holiday crowds not much inconvenience was experienced. Along with Taylor, I, of course, took special precautions on big holiday days, and all those who were trespassing, and had to be turned back, took it in good part and went quietly away. Most of them probably came in ignorance, or through carelessness in not having read the printed instructions posted up in Holmes' Boat House and in the boats. Some of them, more disposed to wit than their fellows, assured me that they 'were not naturalists but only harmless holiday-makers'! Few or no eggs were taken, I think, except those of some common bush- and hedge-building birds, which fell in the way of children, and the latter we never had much difficulty in keeping under control.

There is, however, one very bad poacher at Wassand to whom a line or two may be devoted, although I am afraid that naturalists and birds alike must agree to put up with his constant presence and lay their plans accordingly. He has been known since the time of Linnaeus as *Canis vulpes*.

The coverts here are primarily devoted to his convenience, and some of the reed-beds on the Mere, and the Low Wood in particular, are his chief nurseries in Holderness. The latter is a sanctuary from which not even hounds could push him if he were minded to remain, and it is solely to his roving love of the open field that the Hunt has so often been indebted for the many good runs that have had their starting point here. The same sporting qualities have sufficed to condone the depredations he is continually committing amongst both game and other less generally appreciated birds.

I have seldom seen Foxes so numerous, and so fearless of human presence, as they are at Wassand, and my note-book contains many interesting experiences of them ; but I must here content myself with a summary of the remains of birds, etc., noted from time to time round about one earth on the borders of the Mere, which I used very frequently to visit, and in which a fine litter of cubs was reared this year. The litter was only one of several brought up in the immediate vicinity. Among these skeletons of the feast, the fresh remains of domestic poultry might be noticed almost daily, some fine Buff Orpingtons and other fashionable birds among them, more than once a large and full grown cock, whose size and age, if not his sagacity, might (one would have supposed), have deterred his being brought to so untimely an end. Wood pigeons, rooks (especially after the young ones were fledged), rabbits, hares, rats, blackbirds, starlings, once the wing of a brown owl, and occasional pheasants and partridges, constituted the bulk of the remainder. Feathers and bits of various small birds were not unusual, and of birds more particularly under my care were the remains of several wild ducks, and on six occasions of a pochard. These ducks were all females, and no doubt taken from their nests.

Public boating has for about 25 years past been allowed over the Hornsea end of the Mere, extending to about three quarters of the entire water area. Only a comparatively small portion of the Wassand end is now kept private, the boundary of the open water being marked by a line of posts stretching across the Mere just to the east of the Lady Island. The public boating is solely in the hands of Mr. Holmes, Captain Constables' tenant of the boat-houses, etc., at Hornsea, and is allowed subject to regulations which are printed and posted up on Mr. Holmes' premises, and in each boat ; they do not permit landing except on Swan Island, and prohibit all trespass into the beds of reeds, etc., as well as any interference with birds or their nests and eggs.

Before boating was allowed, Taylor tells me a large number of ducks used to nest upon Swan Island, and the adjacent islet, but only very few breed there now. The Lady Island is still

a partial sanctuary for them, though, through the growing up of the channel which separates it from the mainland, it is liable to be visited by foxes, and other enemies, in dry seasons. As a matter of fact it was constantly so raided this year, prior to the rains setting in, and my removal of the planks which then spanned the channel.

There are no other islands, and there can be no doubt of the beneficial effect it would have on the number of wild-fowl breeding here if the Lady Island were made an island in good fact by the widening and deepening of the channel. Nor would it be a very great undertaking to construct other artificial islands as breeding places in several of the shallower portions of the Mere. In addition to their usefulness for wild-fowl, there can be little doubt that the presence of more islands would soon add greatly to the picturesqueness of the Mere, and possibly to its value in other respects.

A breeding sanctuary or two for birds, in some of the larger reed-beds, might also be made fox-proof by means of wire netting at comparatively little cost, and could probably have nothing but beneficial effects in every direction. A good slice of the Low Wood Morass, so enclosed, ought quickly to become a paradise for birds ; while its enclosure, instead of having any ill effect upon the place as a fox-covert, could easily be so arranged as to actually improve it in that direction, in that it might be much more possible to get a fox away from the wood on days when he was less inclined than usual to be moved.

The Mere is plentifully stocked with Pike, Perch, Roach, and Eels, all of which grow to large size, and the excellence of the fishing is well known and appreciated. Should it ever be desired to increase its value, the introduction of Trout—at present there are none—would, in my opinion, be a good-paying investment. There are also Sticklebacks (*Gasterosteus aculeatus*) in the Mere, some of those I saw in April and May being quite black both above and beneath. Similar black sticklebacks inhabit most of the adjoining watering places, in the fields, and the ditches, where they keep company with plenty of both Common and Great-crested Newts, the latter being, apparently, the most abundant species.

The largest Pike Taylor has seen killed during his thirty-two years' residence, he caught himself some years ago, and it weighed twenty-five pounds. In his record season he killed 1,800 pike, that too being some years ago. The largest single day's bag made in his time was on 4th March, 1884, when Mr. Higgins, Vicar of Foston, and his curate, spinning with roach, killed thirty-six pike, weighing twenty-eight stone, of fourteen pounds to the stone, all big fish, the small ones being returned and neither counted nor weighed. The record Pike for the Mere, during the last thirty years, was caught at Hornsea.

end, from Holmes's boat-house, several years ago, and weighed $27\frac{1}{2}$ lb., measuring 3 feet $8\frac{1}{4}$ inches in length.

During July of the present year I was in the boat with Taylor two or three times when a pike was wanted, and we had little difficulty in catching them, three or four each time, running from about three to eight pounds. The smaller ones were returned to the water. On 1st July, in the stomach of one of about five pounds, were two eels, one fifteen inches long, the other about a foot. Taylor has frequently seen eels in those caught before, but has never found any remains of birds in any pike he has opened. Last season, I was informed that pike were so scarce that actually none was caught!

Roach of upwards of a pound in weight seem to be common here. Holmes has a photograph of quite a number considerably exceeding that weight killed by one of his boats in one day's sport a year or two ago. I saw several dead ones about the sides of the Mere from time to time, well up to a foot long, the largest being $14\frac{1}{2}$ inches, and occasional shoals of fish some of which were quite as large. Holmes's record Roach, during the twenty-six years he has been here, was killed this spring, and weighed 2 lb. $13\frac{1}{2}$ ounces.

Perch of a pound weight are also frequent. I saw some large ones in the water, and five caught by the children from Wassand, a day or two before I left, averaged more than a pound, the two largest being well over two pounds apiece.

Of Eels I used to see many, and large ones, about the fringes of the reeds. Of one of them I had a leisurely view, under a foot or two of water, at the Wassand end of the Mere, on 11th July, and it was one of the largest eels I ever saw. It was lying half buried in the mud, and I rowed back to the boat-house for a gaff in order to try and catch it, but the gaff was very blunt, and it made off on my striking at it. In the thickest part it was quite as thick as the oars I was using at the time, and must have weighed some half-dozen pounds, I estimated, perhaps even more.

Among insects, Midges are a feature of the place, and a sight worth beholding at Wassand. On a calm evening they come out in swarms, and fly over the tops of the trees in dense smoke-like columns which can be seen, with ease, across the width of the Mere. On the Hornsea road the crowds dancing under the lea of the hedges are often so vast that they make quite a haze on the landscape, often bearing a curious resemblance to clouds of dust raised by passing motor-cars at a short distance.

Mosquitoes—of at least two species—are a bane to anyone working about the damp woods. They are rather aptly called 'gimlet-noses' by the natives, and almost every day my legs were more or less—generally more!—bitten through my thick

woollen stockings. This nuisance deters most of the residents from wearing knickerbockers, and I was told, when I went so clad, that I should be obliged to get gaiters of some sort before the summer came. I did not do so but I suffered for it!

It was no doubt a poor season for *Lepidoptera*, as I noticed very few, and none of any particular note. I took a dead specimen of *Hemerophila abruptaria* floating on the Mere near Hornsea in April: a Small Elephant Hawk moth, flying at Heslop's reeds on the evening of 27th June; a Gold-spangle, some of the common Wainscots, and other common things the same night; and saw several *Mania maura* on the wing, a Small Angleshade, Buff-tips, some *Dianthæcias*, etc., during the next few days. Twin-spot Carpets were very numerous, some of them unusually dark varieties. The Swallow-tailed moth is common; also Gold-tail, Wood Swift, etc. The Gold Swift was also numerous along the edges of the reeds, etc., and beautifully bright in colour. A Humming-bird Hawk moth appeared at the rhododendrons about the boat-house from time to time, and I saw one also at Hornsea on 24th June. On the latter date Painted-lady butterflies appeared; Green-veined Whites on 22nd April; Large Garden White and Orange-tips on 8th May; the latter were fairly numerous later in the season. A large batch of Peacock larvæ were on nettles near the round-house. The willows in many places are bored by one of the large *Sesia* larvæ—probably *S. bembeciformis*. It may perhaps be of interest to remark, *en passant*, that I heard much talk of the swarms of white butterflies which appeared at Wassand last summer. 'They covered the fields like a snowstorm,' I was told by more than one interested person, and their larvæ later 'ate up all the cabbages and everything else' in the cottage gardens.

Of the mammals, Foxes have already received attention. It seemed to me extraordinary that there should be no Otters here. There were certainly none on the Mere this year, for I looked for any trace of them in vain, and Taylor, who pays great attention to all such things, and is thoroughly to be relied upon, told me that he had never known but one during all the years he has been here, and that was many years ago. Stoats, Weasels, and Hedgehogs are as numerous as they are permitted to be. Taylor kills a fair number of each every year, but others are always coming in from neighbouring and less preserved estates. Stoats go under the name of 'clubbies,' or 'club-starts' here, and I saw one or two, trapped and otherwise, from time to time. Taylor told me that they killed a polecat at Nunkeeling—a few miles north of Wassand—a few years ago, which he believes was a genuine wild example of *Mustela putorius*—or are we to call it *Putorius putorius* now?—

but he regards the Polecat as 'about extinct now,' and has not seen one for many years.

Mus sylvaticus is of course common, and is here generally called 'the dormouse'—the true Dormouse does not seem to occur here—but although I handled many they did not vary from the ordinary type. Water Voles are common, but by no means abundant, less so, in fact, than the common Brown Rat, of which Taylor's traps in the woods, etc., were always producing a few, his persistence in killing these worst of all common 'vermin' being worthy of all commendation, keepers too often regarding rat-catching as beneath their dignity.

Field Voles and Bank Voles are both abundant, the latter seeming to delight in the dampness of the Low Wood, and in the borders of the swamps. The Water Shrew does not seem to be very common, as I only saw one or two, all of the black-and-white form. The Common Shrew is no doubt common, though I did not see it often, while some of those caught were unusually small specimens, scarcely larger than *Sorex minutus*. The latter appears to be rather common in the Low Wood, where I trapped several examples from time to time. Bats were numerous on the few fine nights we had, but I found great difficulty in procuring specimens for identification, Taylor having a great antipathy to destroying any harmless animal for what he considers mere caprice. The Noctule is fairly abundant: one or two were shot, and many frequently seen, but they were not much noticed till near the end of June. A small boy at the East Lodge, however, had one when I arrived there on 20th April, which he had seen a sparrow pull out of the ivy and begin to worry on the ground, from which he rescued it; but it died, either from his rough handling or the sparrow's. On 1st July, I captured twenty-one Noctules—three others escaping—in a hole in a tree in which a starling had already reared its young. Of those caught fifteen were adult females and six more or less 'fledged' young ones. Several of the females were on the verge of becoming mothers, while some of those to whom the young belonged were giving milk. There was no adult male in the colony. The majority of the captives were allowed to fly again, and others were put back into the hole, but the latter was afterwards deserted. Other colonies occurred in other places. The Pipistrelle is abundant, several being captured or killed. The Long-eared Bat is also probably common, a pair or two being seen from time to time about the trees, and one was shot. Daubenton's Bat is numerous over the Mere, and is no doubt the species which inhabits the boat-house, though I was unable to capture an example there. Several were knocked down on different evenings over the water. There was another species of bat fairly numerous about the buildings at Wassand—where there

are also many *Pipistrelles*—but I was unable to secure specimens except on one occasion, on 27th June, when I got a Whiskered Bat, and this *may* have been the species. At Hornsea I also noticed several medium-sized bats on the wing which I felt convinced belonged to a sixth species, but they flew out of reach of my wand, and I could not identify them. From about the end of June a very pale-coloured bat was seen between Wassand and the East Lodge, but it could not be caught. In certain lights, in the dusk, and against the dark foliage of the trees, it appeared almost buff. Apparently there was only the single individual, and as it kept company with *Pipistrelles* I set it down as a pale variety of that species.

With regard to future watching I should like to add that in John Taylor, the gamekeeper at Wassand, the birds on the Mere have the most efficient protector that your Society has ever employed, and this, of course, throughout the year, not for the nesting season only. He has been on the place thirty-two years, and knows birds well, and takes a keen and kindly interest in them. Unlike many of his brothers in the profession, he never shoots a *rara avis*, but, on the contrary, takes a lively interest in any that appear, and in their protection, and will not tolerate their being interfered with by anyone under his control.

I should also like to say that by placing his boats at my unreserved disposal, and by a number of similar thoughtful attentions, Captain Constable added much to the pleasure and usefulness of my sojourn at his gates, thereby placing me, and the Yorkshire Naturalists' Union, still further in his debt.

From Taylor, too, and indeed from everybody with whom I came in contact, I experienced nothing but kindness, and a desire to further in every possible way my own whims and the work the Union has at heart, attentions which rendered my stay at Wassand an unmixed pleasure, or what should have been so had the weather been only just a little more propitious.

With regard to birds I have thought it advisable to include *all* the species seen. Where no entry occurs it may be taken that the species was not noticed by me.

MISSEL THRUSH.—Breeds numerously, and a nest of fledged young in the Hall grounds on 30th April may be noted as rather unusually early.

SONG THRUSH, abundant.

FIELDFARE.—A party of six at Wassand on 27th April—a very cold evening; the last seen.

BLACKBIRD.—Two or three partially pied birds were noticed from time to time round Wassand. A cock, with a considerable amount of white on his head, and one or two white patches in one wing, bred near the 'stick heap' at the back of the

gardens, but the young showed no white in their nestling plumage.

WHEATEAR.—Not seen in the immediate neighbourhood of Wassand, but odd birds were frequently noticed on that part of the shore of Mere nearest to Hornsea Bridge, and probably bred thereabouts. A pair or two nest on the sea banks.

WHINCHAT.—Not common, but a pair nested near the Stud Farm, another at Heslop's reed-bed, on the south side of the Mere, and another pair near Holmes's boat-house. A male at the latter place on the 24th May was the first seen.

STONECHAT.—Not seen.

REDSTART.—Numerous, and males in full song on the north side of the Mere, between Hornsea and Wassand, as also about the Hall, on the 20th April, and for a few days later, but they soon left, and none, I think, remained to breed—at least none were seen later.

ROBIN.—Of course common. The foundations of a *second* nest were laid against the root of an up-blown beech tree* near the 'Shambles Gate' (into the Low Wood) on 1st June; first egg laid on 6th, and one each day up to 10th, when bird began to sit upon five eggs; hatched on 24th, fledged 7th July.

The FLYCATCHER began to sit on 12th June, the first of five eggs having been laid on 7th; young hatched on 26th, but fell victims to an enemy (? jackdaw or boy) on 27th.

The WREN began to lay on 9th June, laid each day up to 13th, when it began sitting on five eggs, which were still being sat on when they disappeared on 28th.

Another second nest of a Robin against the boathouse wall fledged about 1st July.

WHITE-THROAT.—Fairly common, several nests. First arrivals noticed at Hornsea on 30th April; a nest of fledged young on 9th June; another next day. It is called 'Peggy White-throat' by the men at Wassand.

LESSER WHITE-THROAT.—Also fairly common about Wassand. A male was in song at East Lodge early in morning of 29th April—a bitterly cold day. Several others noticed in adjoining woods later on same day. Nests at East Lodge (in garden), at keeper's cottage (fledged 7th July), Boathouse, Wood, etc., and on roadside near Sigglesthorne. On 30th April birds in song were noticed in several places.

BLACKCAP WARBLER.—Common, but perhaps less so than Garden Warbler. A male was in song at Hornsea on 20th

* This tree root was remarkable in that it sheltered, at the same time, nests of Coal Tit, Robin, Spotted Flycatcher, and Wren; all on the face of the little cliff of earth raised by the mass of roots. The young tits were fledged within a few days of the time the other birds began to build, or lay, but all the others started building on or about the same day—June 1st—there being only indications of their nests that morning.

April, when I arrived. Several about there during next few days, also round Wassand. On 28th and 29th April numbers increased; several nests seen.

GARDEN WARBLER.—Common; apparently more numerous than Blackcap. Several nests seen; one nearly fledged 14th June; one building two days later—laid four eggs and hatched four young on 27th June; robbed, almost certainly by Brown Owl. Another building 21st May.

GOLDEN-CRESTED WREN.—Generally present in the woods and Taylor has usually seen a nest in Boat-house Wood, but the fir trees are nearly all dead there now, and no nest was seen this year. On 15th May, however, I saw a single bird in Boat-house Wood, and another near the Hall a week or two later. These were the only individuals I saw.

CHIFFCHAFF.—One was singing near the Hall on 21st April, but not heard again till 27th June, when two were singing during most of the day, the one in Low Wood, the other at Stick Heap, Wassand. One was in song in Low Wood again on 28th, but was never heard again anywhere in the locality.

The WILLOW WREN was more numerous on and about 20th April, when I arrived, than later; a few nests, however, in most places. There were some just-fledged young on 20th June. The species is not so abundant here as in many places.

WOOD WREN.—None seen, and Taylor did not know it.

REED-WARBLER.—Abounds all round the reedy portions of the Mere, but sticks very faithfully to *Phragmites*, and I saw no nests built except in the orthodox way, on the stems of that plant, and above water. Its chorus of song was a treat to hear in the very early mornings—just before dawn, and while all the other birds were yet silent—and this was continued without perceptible diminution up to the time I left (20th July). The first arrival was heard singing at the edge of Low Wood on 27th April. On 28th one—perhaps the same bird—took up its quarters on the margin of Boat-house Channel, and continued in daily song there throughout my stay, and bred there; but no others were seen or heard till 8th May, when many arrived, and were singing in various places round the Mere in early morning. On 25th May they had become numerous, and were very active, showing themselves on the top of reeds, etc., in a manner they had not previously done. Several were noticed building nests by this date, both sexes being so engaged. I did not disturb the reed-beds at this time, and the first eggs did not happen to be seen till 10th June, when a very cursory examination of a small portion of Lady Island revealed three nests of five eggs each, all partly incubated, and one with young—also five in number—of a few days old. During the next ten days many other nests were seen about the margins of the reed-beds, several with

young, but some still with eggs on 20th June. On 5th July many fledged young were seen on Lady Island and elsewhere, but there was still one nest with two fresh eggs, and an old bird sitting upon another of five eggs. On 10th July a pair was building a nest at Little Boat-house.

SEDGE-WARBLER.—Common and abundant, but not so much so as the Reed-Warbler on the Mere itself. The nests thereabouts were chiefly in rough sedges and bushes, and none in reeds. A nest or two, also, in many of the hedges in neighbouring fields, and as far into the country as my wanderings led—never very far from the Mere.

I went to Wassand on 20th April, and next morning found many Sedge-Warblers round the Mere. Many more arrived early on 5th May, singing at first in fringes of reeds, etc., round the Mere, but within a few days giving place to Reed-Warblers there, and retiring to the scrub of Low Wood, etc., and the neighbouring hedges. There was a nest with six eggs on 28th May, and many fledged young by 20th June.

The GRASSHOPPER WARBLER was not noticed by me, nor did I hear of it.

HEDGE-SPARROW.—Common, of course; and here called 'Cuddy.'

BEARDED TIT.—Early in April, 1911, Mr. St. Quintin turned down three pairs of these, and a week later three more pairs and two odd cocks—fourteen birds in all. This was near the boat-house. At first they flew high into the air, but eventually returned to the reed-beds at the bottom of Low Wood, and for some time afterwards were noticed roosting in trees at the edge of Boat-house Wood. Towards the end of that summer Ake thought he saw a pair accompanied by two or three young ones, but this was by no means certain. On 21st April this year, when Mr. Wade and I rowed round the upper part of the Mere, and he kindly pointed out the various places and things of most interest to me, we saw three males and one female together, off Heslop's reeds, or a little further towards Wassand. John Taylor and his son had seen a male here some time before, and a female shortly afterwards. About the same spot, on 22nd April, I watched two pairs of the birds together, for some time before breakfast, and, with Mr. St. Quintin and Captain Johnstone, saw several later in the day, and I seldom visited this place afterwards without seeing some of the birds about. They were usually very fearless, coming down to the water's edge to catch insects crawling from the water on the outer margin of the reed-beds, often within a boat's length of me. On 30th April, and again the next day, I watched at least two pairs collecting and carrying food to their young in the nest, and, marking the spot, had little difficulty a few days later in finding a nest,

built chiefly of reeds and lined with the flowering heads of last season's growth—a typical nest, situated in a bunch of sedge (*C. paludosa*), one of a bed growing among thinly-scattered reeds, on the landward side of the main reed fringe of the Mere. I waded in to examine this nest on 3rd May, by which date the young had left it, and were moving about and being fed by their parents among the reeds, their progress being by *climbing* from reed to reed, not by flight, of which they were barely capable. They were most adroit at disappearing into the coarse growth of last year's sedge and in concealing themselves and moving about among it, almost defying capture, though several might be within a few feet of me at the same time. There were two nests here within a few yards of one another, and similarly situated in the same growth of sedge, and a third not more than twenty yards away, the young of these being all abroad in the herbage, while, during the time I was watching these young being tended by their parents, I noticed several other adults carrying food (apparently all insects) to more distant nests, and on one occasion had no fewer than eight males '*pinging*,' close to me among the reeds, all mobbing a single female like a band of noisy sparrows! In addition to the ordinary note of *ping*, *ping*, a low *titz*, *titz* is also frequently uttered, and when I was near the young the plaintive *ee-ar*, *ee-ar*, mentioned by Saunders, was constantly repeated. On this occasion, as well as in Mr. St. Quintin's company on 22nd April, the dragon-fly-like flight of the tits, when toying and following one another through the air (sometimes ten feet or more above the top of the reeds) was specially remarked upon.

During the succeeding week or so I marked the site of at least two other nests here—making five in all in this reed-bed—to each of which the old birds were carrying food. On 8th May a pair was watched similarly engaged in the 'jungle' at the bottom of the Heronry Wood, and on 27th May I saw three recently-fledged young among the reeds nearer to our boat-house; so that it is probable at least two nests occurred at this station. In any event it is certain that there were at least six, if not seven, broods safely brought off on the Mere during the end of April or beginning of May, the average number of young being probably not fewer than five. On 28th May I saw six young, pretty recently fledged, sitting side by side near the top of the reeds at the water's edge at the mouth of our boat-house channel, sunning themselves in the early morning and waiting to be fed.

On 12th May Mr. H. B. Booth and I saw several adults about Heslop's reeds, and he took one of the nests which I had marked as fledged on the 3rd, and this he subsequently presented to the Museum at Hull.*

* See *The Naturalist* for June 1912, pp. 168-170.

By 11th June several pairs were again carrying food to young in their second nests, and some were still so occupied up to the second week in July, these second nests occurring both in Heslop's reeds and in the bed to the east of it, as well as at the bottom of Heronry Wood.

Owing to the number of fledged young on the wing by this period, it was not easy to actually fix the position of these second nests, but it is pretty safe to say that at least six and almost certainly seven, first broods were reared, and probably as many second broods hatched before I left. By this date (20th July) all the second broods had not left the nests, but on the early morning of 9th July, while I was paddling round the reeds on the south side of the Mere, I found a railing, which runs some distance into the water and marks the eastern extremity of the reed-beds here, covered with a little throng of small birds, warming themselves in the early sun's rays, and ever and anon catching flies on the rails and the adjoining reeds, as well as occasionally picking them from the surface of the water. Of this gathering the majority were certainly Bearded Tits. As the boat drifted clear of the reed's, and came suddenly upon this little company at too close quarters, most of the birds took fright and disappeared into the herbage. Besides tits it contained many young Reed and Sedge Warblers—and possibly some adults—and a single Whinchat, and, as I lay quietly waiting, many of them gradually resumed their posts on the railing. There was nearly constant motion going on amongst them, and it was impossible to make sure of an exhaustive tally, but I succeeded in counting at one time upon the rail no fewer than twenty-nine Bearded Tits, all of which were in immature plumage, and I had no reason to suppose that that represented the whole gathering. The manner in which they clustered together much reminded me of Budjerigars, as I have seen them in an enclosure, while their chatter of *titz*, *titz*, and their flight as they disappeared into and over the reeds, on being disturbed, was such that I entered them in my journal as 'Long-tailed Tits'! The black stripes on the back are very distinct in this plumage, and the fawn-coloured tints of the rest of the plumage makes the birds look scarcely more yellow than the breast of a female Whinchat.

It was to bask in the early rays of the sun that no doubt brought about this gathering—such mornings were particularly scarce at the time—but as already noted, all the birds, tits and warblers alike, were also actively engaged in fly-catching, and it was the fat-bodied and rather sluggish Golden-yellow Midge (*Chironomus plumosus*) that provided the *pièce de résistance* of the banquet.

On my way back to Wassand the same morning I encountered a family party of seven young Bearded Tits in the

reeds near the boat-house, probably the produce of a second nest, and I had, earlier, seen some adults not far from the same place, as well as in the Round House reed-beds, thus demonstrating that the unusual collection of twenty-nine—however many more the party may have contained—did not represent all the tits on the Mere, and with such evidence before us the success of Mr. St. Quintin's introduction scarcely requires comment. The birds are now gradually extending themselves to all the reedy portions of the Mere, and another breeding season will probably find them both numerous and well-distributed round it.

Personally I attach no importance whatever to the doubts expressed about their migratory instincts leading them away from the Mere, but as denoting a less exclusively reed life than one might at first expect of them, it may be mentioned that I have seen a few of the tits hunting the bushes and lower tree branches in the Boat-house Wood where it borders the reeds, and that on 30th April, when walking through the fields towards the Mere, I was surprised to meet a male Bearded Tit in a low hedgerow quite a hundred yards from Heslop's reed-bed and dividing a grass field from a fallow one. He mounted high into the air, after one or two shorter flights, in a manner not unsuggestive of the dancing flight of a pipit, and then made straight back to the reeds, *ping-pinging* as he flew, and presenting, as usual, the somewhat ludicrous appearance of a bird unduly hampered by its length of tail!

The only probable enemy the tits are likely to have on the Mere is the Sparrow-Hawks which occasionally haunt it, and to these they would probably fall an easy prey, but these may safely be left to John Taylor to look after.

BLUE TITS and GREAT TITS both common; various nests seen.

COAL TIT.—None were seen until 15th May, when one was observed gathering fur for its nest from the dead stoats and rats in the 'gamekeeper's museum' near the boat-house. No doubt it nested thereabouts, for one or two fledged broods were noticed about Wassand later. As already mentioned, a nest in an uprooted beech tree on the borders of Low Wood was fledged on 12th June.

MARSH TIT.—Never seen, nor did Taylor know it.

LONG-TAILED TIT.—Taylor has usually known a nest in Boat-house Wood every year, and sometimes one elsewhere, but none this year anywhere on the estate, and I did not see a single bird.

WREN.—Common. A nest—as usual—in the boat-house, fledged early in June, and a second nest was built, and the bird was sitting in it, when I left on 20th July; several other nests elsewhere.

CREEPER.—Numerous, more than half a dozen nests were seen; one at little boat-house, with eggs in it on 22nd April, another building in our boat-house roof on 25th, reared brood which were fledged on 24th May, and the old birds immediately set about building a second nest, one of them being busily engaged in doing so on 26th. Another nest in Low Wood was incubating on 22nd April; a fourth, in Rookery, also sitting same day; and a fifth in our garden at East Lodge.

PIED WAGTAIL.—Common, there being several nests round about, one in the conservatory over the front door at Wassand, and another at the keeper's cottage.

WHITE WAGTAIL.—A male, one of a pair, was seen on a young cornfield near Heslop's reeds on 26th May, but I could not be certain whether his partner was a White or a Pied Wagtail—she was of the ill-defined type which might pass for either. I could not find them later, and saw no more of *M. alba*.

YELLOW WAGTAIL.—Several pairs breed round the Mere, one in the field below Heslop's reeds, another in 'Armitage Field' on the opposite side of Mere, and several about Holmes' promontory and at Hornsea end. Some also were noticed in fields along the sea coast. A pair was first seen on 26th April, on side of Mere below 'Round House,' a field in which they do not breed but in which Taylor says he has frequently noticed the first arrivals of the season. Several pairs had arrived by 30th April.

TREE PIPIT.—Numerous in April, many nests, but only a small proportion of the birds which lingered for a week or two round the Mere eventually remained to breed here. Several were in evidence on 21st April—my first day on the Mere—a further considerable increase in numbers taking place on 26th.

The **MEADOW PIPIT** was numerous when I arrived on 20th April all round the Mere, and continued so for a week or two. Many then moved on, a considerable number remaining to nest in all suitable places, fields, etc. A nest with almost fresh eggs—five of them—which I saw on 2nd May, fledged on the 28th.

GREAT GREY SHRIKE.—Taylor has seen it here in winter.

RED-BACKED SHRIKE.—I could discover no trace of this bird this year, and none certainly about Wassand or the Mere. Taylor saw one last year not far from Hornsea Brickworks, the only example he had ever noticed here.

SPOTTED FLYCATCHER.—Common, there being a nest every year against the boat-house, another against the Hall, one on the keeper's cottage, another on East Lodge, etc., etc. A single bird arrived at the boat-house on 11th May, the first seen this year, and a nest, begun to be built there on the 18th,

began to lay on 28th, and to sit on five eggs on 1st June; young hatched on 15th, and left the nest on 27th June. Nest in the beech tree root began to be built on or about 1st June—on which date there was only a ‘scrape’ on a bank of soil and an odd bit of lichen in it,—first egg laid on 7th and fifth egg on 12th, when incubation started. Young hatched on 26th, but disappeared next day. A nest against Taylor’s cottage had half-grown young on 27th June. They were fledged during the next week, and by 6th July the birds had built a new nest, about a foot away from the old one, and were at that date incubating a second clutch of five eggs.

PIED FLYCATCHER.—Not seen by me, but Taylor has occasionally seen it in spring in other years.

SWALLOW.—Numerous, there being fully fifty individuals over the Hornsea end of the Mere when I arrived on 20th April. Many nests in buildings round Wassand, and one in back porch at East Lodge, begun about 1st May but not finished till 20th; young—five of them—fledged end of June, and while still engaged in feeding these outside, the old birds within a few days started building a new nest.

MARTIN.—Was not numerous this year, but a few nests were seen on houses at Hornsea, and at farms, etc. One or two of the birds, with Swallows, were seen skimming over the Mere on 20th April.

SAND MARTIN.—Many always over the Mere, and large numbers were there on 20th April. A flock of some hundreds, apparently fresh arrivals, passed up the Mere on 11th May. On 19th May, just at the darkening in the evening, a compact flock of quite fifty passed swiftly overhead at Wassand, flying due north, though not very high.

GREENFINCH.—Common, and about the end of June assembled in flocks, old and young together, to feed on seeds of Scotch elm (*Ulmus montana*), on the sides of the road at Wassand; for a few days almost to the neglect, apparently, of other food.

HAWFINCH.—Not seen by me, but Taylor observed that a pair nested near his cottage a year or two ago, the only ones he had ever seen here.

GOLDFINCH.—According to Taylor and others was fairly numerous here some twenty odd years ago, but the numbers have been much reduced by birdcatchers. It is now again picking up and increasing, especially since Taylor began to systematically shoot down the Jackdaws—one of the worst enemies to this and other small nests.

By everybody locally the Goldfinch is called ‘Red-cap.’ One was in song in East Lodge garden on 21st April, two pairs on roadside between there and Hornsea; pair in a garden in Hornsea on 26th. On 28th April I watched a pair building a

nest in a large thorn at 'the Mere End,' Wassand, but this nest (like so many others) was, without any apparent cause, abandoned a week later, after having been completed. The female did all the nest-building, though accompanied in all her journeys to and from the ground for materials by the cock, who contented himself by singing his approval. A brood of five was successfully brought off close to the entrance to Wassand; another in the grounds of the Hall; and two on the road-side elms on Hornsea Road. Another nest in an old ash tree—skilfully concealed amongst a bunch of 'keys'—was built about the end of June, in the park close to East Lodge, and hen still sitting on nest (too high up to examine) when I left Wassand on 20th July. In all quite half-a-dozen nests were seen, from which broods got off.

SPARROW.—Of course common, but not so excessively numerous here. I more than once noticed a male 'worrying' a cockchafer on the road-side, an observation I have often before made in other localities.

TREE SPARROW.—Not uncommon, and several nests seen; one at East Lodge, another at Wassand, and one or two about Hornsea. A pair was feeding young, in a decayed willow in the Heronry Swamp, on 14th July.

CHAFFINCH, of course common.

MOUNTAIN FINCH.—A pair seen at the south side of Low Wood on morning of 26th April; another pair on Hornsea road, north side of Mere, same afternoon, both males singing and in summer plumage. On 28th April, while watching Goldfinches building at 'Mere End,' saw and heard a male Brambling in full song in the adjoining wood. This bird was also in full plumage. On 8th May, I came upon another (or the same) male in Low Wood, in full dress, singing right in the middle of 'jungle,' but nothing more was seen of them.

LINNET.—One of the commonest birds here, nesting in road-side hedges, bushes, in the gardens, in willows, etc. in Low Wood, and elsewhere.

REDPOLL.—A few pairs breeding here—'about the usual number' according to Taylor and others. A nest in roadside tree opposite Lady Island; another in high hedge near East Lodge. A pair was watched building on 20th May; probably three nests or so, in all, on the Mere side.

BULLFINCH.—Several nests; one fledged close to Hall in June; another found sitting on five eggs in Heronry 'swamp,' in a low sallow bush, overgrown and overshadowed by reeds, beyond the margin of tree growth. Another nest in 'Fraser Wood.'

CORN BUNTING.—Several pairs breeding on south side of Mere, round Heslop's reeds, etc. Seems to be more numerous along the sea-coast fields. Those which came to breed on the

Mere side did not arrive there till 12th May, on which date I noticed the first I had seen, in 'Armitage Field,' on the north side of the Mere. A pair on the opposite side settled into their breeding quarters the same day, and by 20th May each breeding pair—perhaps half-a-dozen in all—had established itself where it intended nesting, and the cocks were in full song.

YELLOW HAMMER.—Fairly numerous along the road sides, etc., but none nesting about the actual margins of Mere; called 'Gouldies' locally.

REED BUNTING.—Numerous; breeding in all the rough margins of the Mere. First young were fledged about the end of June and second nests began early in July. I photographed one sitting on four eggs in Heronry Swamp on 14th July; another found with one egg at Heslop's reeds on 8th July, which, four days later, began to sit on 4 eggs.

STARLING.—Abounds, to the detriment of woodpeckers and some other birds; throughout the summer a few hundreds were nightly roosting in some of the reed-beds; later in the year these become the resort of 'millions,' as I was told by the natives. By 1st July I estimated there might be 5,000 Starlings roosting in Heslop's reeds, but they increased rapidly, and a few days later the number had certainly been doubled. Before I left (on 20th) there could hardly have been less than 50,000, I should think, though such sums in arithmetic are rather beyond me!

A pair nested and hatched two young in an ash tree in the park, *in the same hole* which at the time contained a White Owl's nest and young one: the two sets of young being separated only some three feet from one another (but see account of White Owl, page 24). Others drove away our only nesting Green Woodpeckers.

JAY.—Has been killed out, and is rarely seen in neighbourhood now. Thirty years ago it was not uncommon, Taylor tells me.

MAGPIE.—About Wassand itself has almost disappeared with the Jays, but several pairs breed on adjoining properties only a few miles off, and I saw an occasional passing bird.

JACKDAW.—Would be very numerous if not kept rigorously under by Taylor. Tries to nest in every available tree, and odd broods get off. Many roost in the rookery.

CARRION CROW.—Only kept down by constant killing.

HOODED CROW.—Taylor shot one just before my arrival on 20th April. I saw one flying over the Mere on 21st. Common in winter.

ROOK.—There is a large and increasing rookery in Low Wood; other groups of nests about the Hall, in 'the Gladiator Field,' etc.

LARK.—Numerous all round the Mere, breeds in the adjoining fields.

SWIFT.—Numerous and often in large flocks of several hundreds over the Mere. Some of the workpeople told me when I went to Hornsea that 'to see a Swift was a sign of rain.' It generally proved to be a true proverb this year, for after they came we had rain on most days! Quite a dozen were hawking over the Mere on 30th April; in the evening we had seven degrees of frost. A fine spring day on 1st May with S.E. wind, was our first 'balmy' day, and Swifts became numerous. Many breed at Hornsea.

NIGHTJAR. Very rarely seen here. Taylor and I heard one (the first he had ever heard here) *purring* in the park on the evening of 10th June, but I heard or saw no more of it.

WRYNECK and NUTHATCH, unknown here.

GREEN WOODPECKER.—Taylor says this bird only appeared at Wassand last year for the first time during his residence (32 years). This year we had at least two pairs in April, but only one pair apparently remained to attempt breeding. They bored a hole in an ash tree near the Boat House, with great diligence, and apparently completed it by 10th May. I noticed them first engaged at it on 25th April, by which date the hole was already large enough to allow a bird to get quite out of sight in it. The chips were allowed to fall to the ground at the foot of the tree. The 'nest' was seemingly ready for eggs—if the hen had not actually begun to lay (for it could not be examined)—by 10th May and next day a ceaseless persecution by Starlings began. Several of these had by that date nests in the vicinity—some of them already having young—one or two being within twenty or thirty yards of the Woodpecker's tree; but as already noted there were considerable numbers of non-breeding Starlings roosting in the reeds on the Mere throughout the summer. A few—nearly always in pairs, sometimes two or three pairs in company—of these Starlings had sung and whistled on the tops of this and neighbouring trees all along, and a casual look at the hole had sometimes been taken by the more inquisitive of them, but up to the evening of the 9th May they had not shown any disposition to interfere with the rightful owners, and the Woodpeckers had remained unmolested. That evening, however, I noticed the Woodpeckers beginning to resent a too frequent visit by Starlings to the neighbourhood of their hole, and had made up my mind that it would be advisable to get Taylor to shoot some of them at once. Next morning the persecution had become incessant and it continued so throughout the day, in spite of the fact that for several hours I remained in the vicinity and did all I could to keep the Starlings away. One Woodpecker in particular (probably the male) kept up a continual battle with the intruders, chasing them away from the hole with loud cries, and on one occasion I saw him (if it were the male as sup-

posed) actually come to grips with a Starling on one of the branches close to the nest. He caught the Starling (apparently about the neck) in his bill, and with much fluttering and shaking the birds fell to the ground—a distance of twenty feet or so—locked in close embrace. On the ground they fought savagely, though the grass, etc., there hindered my view—I was within about twenty yards of them with my glasses—both Starling and Woodpecker shrieking and chattering alternately. In such a struggle one would naturally expect the formidable bill of a Woodpecker to be an effective, if not actually deadly weapon, and, anxious to see the outcome, I did not interfere, although cautiously advancing a little closer. After an encounter of certainly a full minute, the Starling made its escape and flew off, apparently none the worse, and the Woodpecker rose after it, but did not pursue. On the contrary, it mounted up to the neighbourhood of the nest again, and there began chasing away the two or three other Starlings which had been chattering there all the time.

Seeing that it was outnumbered, and apparently tiring, I then went to its assistance, and pelted the Starlings away with stones. Of course this also frightened the Woodpecker, but that seemed to be the lesser of the two evils. Whenever the Woodpecker went in pursuit of a Starling it repeated its '*rain-call*' loudly, and except on that one occasion the Starlings appeared to consider discretion the better part of valour.

Taylor was, unfortunately, otherwise engaged that day, but I got him down at night with his gun, when he shot three Starlings from the hole, and missed or wounded a fourth, within half-an-hour or so. We only gathered two of these from the long grass, etc., both females, in dark, almost spotless plumage, with purple gloss* and very yellow bills. The eggs in the ovary of one were not larger than No. 3 shot; in the other three or four were perhaps the size of peas.

Next day (the 11th) Taylor shot four more Starlings from the hole, but did not gather them. On 13th he shot eight, and five more on the 15th. Of these I dissected seven, three males and four females. One of the latter might have laid in the course of a day or two; the others all very backward, no eggs larger than say, No. 7 shot in any of them. Two of them had dark unspotted plumage, two being duller and much freckled, including the one with the large eggs. All, males and females alike, showed purple reflections. May 20th, another female shot, eggs very backward, plumage unspotted; 21st, two more shot but not gathered; 24th, one shot at and wounded, if not

* I attach little importance to this so subtle distinction—purple or green reflections being chiefly a question of how the bird is held with respect to the light.

killed, but lost in dusk : 27th, another female shot, eggs being again very small. After this date no more came actually to the hole so no more were shot, but many non-breeding Starlings remained about, and some of them at least appeared ready to breed if nesting holes were found. Yet all holes were not occupied and it can scarcely be supposed that the birds made any really serious efforts to breed.

Had Taylor been available at first, more Starlings might have been killed at the hole, as it was seldom, between say 9th and 27th, that a few were not to be seen about it, often going into it, and the cocks singing just outside. Altogether, 25 were actually shot and several more believed to have been wounded.

I do not think that the Woodpeckers were seriously interfered with by the shooting (without it the Starlings would certainly have effectually prevented their nesting), but after the 10th they appeared to abandon the hole. One or other of them occasionally appeared in the vicinity during the next day or two, but after the 13th they disappeared altogether, and were not seen or heard again anywhere on the estate.

GREAT SPOTTED WOODPECKER.—Never seen by me, but Taylor has frequently seen one or two in other years, and believes they have sometimes stayed to breed, or at least they have remained over the summer.

KINGFISHER.—When I arrived at Wassand one of the first birds to attract attention was a Kingfisher, having its nesting hole in the bank just below the bridge over the ditch at the East Lodge. It frequented the place for a week or two, but never more than a single bird was seen, and it eventually disappeared. I examined the hole (which no one else went near as the soft mud of the ditch would have betrayed the foot-marks) and found it bored fully 3 feet into the bank, as measured with a stick ; the bird was frequently noticed leaving it up to about the first week in May, and in former years there has been a nest here. A Kingfisher at times made use of the platform in our Boat House to fish from and batter its captures against, but there was never more than one seen, and apparently no nest brought off this year.

THE CUCKOO was common, but not plentiful around the Mere. I saw and heard two individuals on 21st April, Taylor having heard the first of the season on the previous afternoon. No more appeared till 26th, when one was heard in early morning, and one heard every now and again afterwards up to 5th May, when several arrived and remained. The last was heard on 25th June ; one seen on 26th ; these of course adults. No eggs were seen, and only one young one. It was hatched by Meadow Pipits in the park, and was just a few days fledged when the hay was cut. It was still there on 17th and 18th July, flitting about from one haycock to another.

BARN OWL.—A pair or two usually nest about Wassand and 'always have done.' This year there were at any rate two, and probably a third nest, up the road near Sigglesthorne, where birds were frequently seen. One brood was fledged about Boat-house Wood early in June. The second nest was in the Park in an ash tree three hundred or four hundred yards from the Hall. Taylor and I disturbed the two old ones from this hole in passing on evening of 8th June. Next morning I went to look at it, and found it contained a single young one, apparently about a week old, one of the adults again leaving the hole when I kicked the tree, almost immediately followed by a Starling !

On climbing the tree I found that the hole extended downwards into the trunk for some distance, and upwards into one of the principal limbs. At its bottom was the young Owl, while tightly wedged into the upper extremity of the hole was the Starling's nest containing two partly incubated eggs, the distance between the two nests being just three feet, both birds using the common entrance. The young Starlings were duly hatched and reared up to the fully fledged state, but one at least of them would then appear to have fallen a victim to the Owls, as on 11th July I took the picked and dry skeleton of a young Starling from beside the young Owl : of the second no trace could be found, but a week previously it had been noticed that the young Starlings had left their nest. The size of the cavity was such that the Owls could have reached the Starling's nest at any time, and from the situation of the latter it was improbable that the young could leave it without falling head-long down beside the young Owl ; while once down at the bottom of the hole it would require considerable exertion on their part to get out of it again. If in these circumstances the Owls departed from their usual 'non-avivorous' habits, who could blame them ? In the expressive language of Holderness, Taylor described the temerity of the Starlings as 'fondbrazant.'

No other remains of birds, it may be added, were discovered in the rejected pellets of the Owls, examined from the nest from time to time, nor other traces of an avine diet. On several occasions freshly killed mice and voles occurred beside the owlet, sometimes partly devoured, and the exuvie chiefly consisted of the remains of these. An old White Owl was frequently to be seen in the evenings, hunting over the rough and boggy bit of ground near Heslop's reed-bed, which abounded with voles and was also a favourite resort of both Kestrels and Brown Owls, and it was more than once remarked that when a White Owl chanced to be prowling there when a Brown Owl arrived, the former immediately cleared off, as though it recognised that its dark cousin claimed to have first fruits, and brooked no poaching on his demesne.

BROWN OWL.—Common, and the keeper would be glad if it were less so, as it is a well known robber of the nests of small birds, and when pheasants used to be reared here was more than once caught in the act of taking chicks from the coops. That, however, is an old and often told story. In 1912 there were as usual several broods of Brown Owls reared at Wassand; one in Boat-house Wood, another near the Round House. I several times noticed one of these owls hawking over the reed-beds in the gloaming, and more than once saw one drop into the reeds where these were growing in a foot or so of water, and where it seemed very unlikely that the prey could be anything else than birds of some kind.

COMMON BUZZARD.—Taylor's son—William—saw one soaring over the Low Wood about mid-day on 14th May. On 23rd May I picked up an unmistakeable feather from the back of a Common Buzzard. A pair was reported to have been seen soaring together over Grimston Garth (a few miles south of Hornsea) on 12th May. James Taylor, another son of the keeper, saw one at Catwick Covert, two or three miles west of Wassand, on 2nd June, and was on one occasion very close to it. Occasional Buzzards have been seen by Taylor in former years.

SPARROW HAWK.—As common as the keepers allow it to become; there is usually an attempted nest at Wassand, sometimes two. From the date of my arrival I occasionally noticed a Sparrow Hawk prowling round the Mere. There was only a single nest this year.

KESTREL.—Always a pair or two about Wassand, and usually a nest. Several pairs breed on adjoining properties.

CORMORANT.—At least one or two may be seen on the Mere almost any day throughout the year, fishing, flying over, or holding up their wings to dry on one or other of the posts protruding from the water. The 'boundary posts' are favourite perches and are sometimes all occupied at the same time. The landing stage on the Lady Island is another frequently used seat, and on it I have seen castings containing remains of perch, roach, etc. There were seldom fewer than four or five Cormorants on the Mere during my stay, and I frequently watched one or more of them ringing upwards to depart northwards, or arriving thence at considerable altitudes; the line of flight (always about the same) pointing across 'Armitage Field' in the direction of Flamboro'. Most of the birds were in black plumage, but I never saw one in summer garb. On 29th June a white breasted one was present on one of the posts, and the same or another similar bird was seen again on 12th July. The white on the breast was not very pure.

HERON.—With the well-known Heronry here, is of course always present in considerable numbers. Mr. Wade had visited Wassand and counted the nests about a week before my arrival,

and ascertained that there were 32 occupied. On 6th May, and again two days later, I counted 33 nests, all containing young, and there were two more apparently not at the time occupied, though beneath one of them I picked up an egg recently sucked (no doubt by Rooks) which had been quite fresh. Many of the young were at this date almost fledged, but in several nests they were yet quite small. On 17th May a fledged young one, hardly able to fly, was caught in the park, having no doubt attempted to leave the wood too soon, perhaps scared by the Rook-shooting party that day. I saw young abroad almost daily after this, though it was quite ten days later before the bulk of them had quitted their nests, and it was not till the beginning of June that they began to be seen numerous on the fringes of the reed-beds, and fishing round the Mere. When in the Heronry Wood, or 'Jungle,' on 27th June, I disturbed many fledged young, roosting with some of their parents, in considerable gatherings, on the ground beneath the trees; and found in one or two places, several yards of 'Flagging' (the local name for reed-grass, etc.) quite paddled down by them. At one time on this occasion, I counted fifty-seven Herons on the wing, above me.

On 14th July there were six nests in the Heronry, all within quite a small area, containing late young ones; in two of them the young being practically fledged, some of them sitting out on the branches near their nests; in a third they were slightly less forward; in two others about half grown; and in the sixth quite small, apparently not above a few days hatched. I was unable to say that some of these nests had not been counted in my estimate of thirty-three of 6th May, but at least one or two of them had been built since that date, and one of them was that beneath which I had picked up the sucked egg.

Throughout my stay at Wassand numbers of Herons might be seen every evening leaving the Heronry just before dusk, while after dark the loud 'franks' of yet passing birds testified to still later departures. Most of them shaped a south-westerly course, nearly over Wassand, but many also went west and north-west. During the first few weeks of my visit practically all fishing was done in these directions, and at a distance, a Heron being rarely seen on the Mere sides. As the demands of the young became more pressing, however, the old birds began to do more fishing nearer home, and, latterly, considerable numbers of both adults and young might be seen sitting about the fringes of the reed-beds, in many of the more open courses, and elsewhere round the borders of the Mere. At dawn and dusk I have seen them there in dozens. Frogs were then numerous there, and probably formed a chief attraction, as also were eels in several places. In the early mornings I used frequently

to watch the arrival home of the Herons to their wood, often 'coasting' down on partly closed wings from high in the air. While I was lying in the boat during a thick fog, early in the morning of 14th July, two Herons passed, 'honking,' over within 20 or 30 yards of me, flying up the Mere towards the heronry. A third, close in their wake, was passing much nearer, but saw me and swerved off, though his fright was not great enough to cause him to drop a fish which could be distinctly seen, carried cross-wise in his bill—quite a fair-sized fish, probably a Perch or Roach, of some 6 or 8 inches in length.

Hérons have increased much here of recent years. John Taylor came to Wassand 32 years ago, and during his first year there was only a single nest. No Rooks built in the vicinity at that date, nor for some years later, but within the last few years Rooks have been encroaching more and more upon the Herons, and this year the nests are much intermingled, to the apparent considerable uneasiness of the Herons.

PURPLE HERON.—Mr. Sheppard has been good enough to draw my attention to the fact that there is a male Purple Heron in the Hull Museum, which was shot on Hornsea Mere in 1862.

BITTERN.—Has been a frequent visitor to the Mere during the cold months of the year. Taylor has seen not fewer than twenty during his thirty-two years' residence, on one occasion, a few years back, one standing upright in the reedy ditch near the Boat House, within a few yards of him. A Bittern has never been heard 'booming' here, however.

GLOSSY IBIS.—Captain Constable saw one on the Mere side four years ago, Taylor being in the boat with him at the time. In 1909 two were shot at Burton Constable. One of Captain Constable's tenants shot one near Hornsea about the same time, and had it stuffed: it is now in the Hull Museum. One or two others were seen a year or two later.

MUTE SWAN.—The tame, unpinioned birds on the Mere have latterly increased to about fifty, a sufficient stock, beyond which Captain Constable is not anxious that they should go, and the eggs have been taken this year and last. The number of Swans on the Mere is subject to some variation, little bands coming and going from time to time. On 8th June we could only count 35; a day or two later there were 42; on 9th July I counted 47, and between these dates various intermediate numbers. Nests are scarce considering the number of adult birds present; only three or four birds show any brown immature feathers, and yet last year there were only 5 nests. This year there was a like number, two upon Swan Island, one on the Green Island adjoining, one on Holmes' promontory at Hornsea, and one in Heslop's reeds. Eggs were late in being laid, the first nests, containing two or three eggs respectively, being taken on 18th May, when incubation was just beginning. On 8th June a

nest of 4, practically fresh, was taken on Green Island. By 1st July most of the birds had cast their quills and were incapable of flight, though when I left on the 20th, half-a-dozen or more were still flying about.

WHOOPEE.—Wild Swans occasionally visit the Mere during winter. Mr. Taylor writes me that a flock of eighteen, all immature birds, arrived there on 5th November of the present year, but they only remained for two days.

SHELDRAKE.—An occasional visitor. A pair was at the Wassand end of the Mere, with other ducks, early on the morning of 24th April. On 5th July a flock of 14 came flying up the Mere while I was out in the boat, about 5 a.m. They were rather high in the air and did not alight, but turned back towards Hornsea. On 10th July eight left the top end of the Mere, with other ducks, when I took the boat out about 7 a.m.

MALLARD.—Always present in considerable numbers, and a fair number breed—probably as many as the foxes will allow, several ducks being taken off their nests about the woods, etc. I saw the first young ones on the 6th May, one brood was quite small, another about the size of Teals, near the Boat House. On 7th May a brood of a few days' old was seen on Lady Island. By the 21st June there were many broods about in all parts of the Mere. Most of the drakes were then in full eclipse dress, some still changing. By the end of June quills were being quickly shed, all drakes except one or two being now in eclipse, and many of them incapacitated from flight.

GADWALL.—Mr. St. Quintin saw a pair here in April last year. I thought I saw a drake on 12th May this year, but was too far off to be sure of it. On 6th July a female rose from Heslop's reeds. On 10th May a suspicious duck was seen but not well identified. Except on these occasions no Gadwell were noticed here this season, and certainly none bred here.

SHOVELER.—This duck was disappointing this year, and I suspect is frightened off by the foxes, its nests, often far from the water, being very liable to suffer. No broods or nests were seen, and I do not think we had any at the Mere itself; but they must breed somewhere at no great distance, as adults were almost constantly present. In other years there have usually been one or two nests here, seldom more, but they have been gradually decreasing of late. None has been shot during the last year or two, those seen being spared in the hope that they might increase again. Formerly a fair number used to be shot every autumn. I saw the first Shovelers on 26th April—a pair—but a month previously Taylor had seen several pairs about. Two drakes were together on the morning of 28th April, a pair on 7th May, and again on the 15th. Later on the latter day, when out with Mr. St. Quintin and Mr. Meade Waldo, we saw two drakes several

times, three together on one occasion, and once a pair. On the 16th May I watched a pair actually tread near Lady Island. They were at the same place again on the 18th, and two other drakes were together on the opposite side of the Mere. On the 4th June there were four drakes together on Holmes's promontory; on the 5th three pairs and six drakes in a flock, at Heslop's reeds—nine drakes in all; on the 29th a flock of fifteen drakes rose from these reeds; on 1st July thirteen drakes were together at the same place, and three or four odd ones in other parts, and a pair—male and female—at Wassand end; on the 5th July about a dozen drakes were together at the Wassand end in the early morning; on the 6th, eleven were there at 4 a.m., and six more at Heslop's reeds—seventeen in all; on 9th July sixteen drakes together, which, as usual, flew right away on being disturbed, and several more—perhaps six or eight—were in twos and threes in other places; on 11th July a single drake; on 13th about fifteen drakes together, and later in the day I disturbed three well-fledged young from Heslop's reeds which had certainly not been bred here; on 14th July, at 3 a.m., I saw three drakes arrive on the Mere from high overhead; and on the 15th, again about the same hour, five of them came in from far away westwards, and six more about an hour later. On other dates were similar occurrences.

TEAL.—Always a few pairs present, but seldom appear to nest here. On 21st April I counted at least twelve pairs on the Mere, and about as many, often more, during the next week or two. On 28th April I saw six females together in a flock, besides many others in pairs, etc. Two or three pairs were seen on 7th May, but by the 18th they had become scarcer. On 23rd May I saw a male and two females together; on 25th May I sprung a female from her nest in Heslop's reeds, and the fledged young were there later; on 5th June at least three pairs were on the Mere, and about a dozen birds were together on the 29th; on 1st July a flock of thirty-nine together, besides several smaller lots and odd birds in other parts of the Mere. They all depart westwards like the Shovelers, and were also often seen arriving thence. On 9th July many more were seen, and again on the 15th.

GARGANEY.—It may be well to add here that a Garganey—a bird Taylor had never known to occur there before—was shot at Wassand on 2nd October, 1912. It was a female, and has been preserved.

WIGEON.—Six were seen together on the Mere on 20th April, and a pair, in full plumage, together on the next day, besides others mixed up with other fowl. A pair was still here on the 25th April, but none was seen later.

POCHARD.—About a dozen pairs were on the Mere on the

21st April, when Taylor said they were just beginning to arrive; quite fifty birds on 22nd April, and there were even more by the 25th. Some have always bred here during Taylor's time—thirty-two years—and the numbers are probably increasing. On 30th April I counted ninety-two at the upper end of the Mere, in addition to which there were certainly many more in other parts. On 1st May some of the ducks were beginning to lay, and there was a marked falling off in numbers from about this date, but something like fifty pairs stayed on the Mere throughout the remainder of summer, a large proportion of which no doubt bred, or attempted to do so. On the morning of 20th May I counted fifty-seven males on the water in various places, and this probably did not include all. Numbers of ducks were with them, and others were doubtless on their nests. The first of the ducks began to sit about the middle of May, but some were still laying by the 20th, on which date I saw a pair treading. Many nests were undoubtedly drowned by the floods on the 23rd and 24th May. The first young appeared on 18th June, at the bottom of Heronry Wood. On 1st July four young were brought off from a nest at the boat-house channel, and Coots were chasing them! On the same day two nests in Round House reed-bed produced only two young each. During the next three weeks several other females were seen followed by only two or three young each, in one case by only a single chick, and five was the largest brood seen. This was the produce of nests averaging about nine or ten eggs each! The Tufted Ducks which escaped drowning hatched better. By 1st July drakes were beginning to cast their quills, and a week later most of them 'flappered' to the shelter of reeds etc., instead of flying as heretofore, on being disturbed.

TUFTED DUCK.—Taylor reports that very few of these have hitherto bred here. There was one nest last year, however, the first since the Yorkshire Naturalists' Union visited the Mere a few years ago, he thinks; and in that year he did not consider there were more than two nests. Large flocks of these ducks appear every spring, a few staying, but the majority going elsewhere by May. On 20th April there were certainly two hundred on the Mere. They appeared to become still more numerous during the next week or two, but about the beginning of May they decreased daily and rapidly. Only about six pairs were visible on the 7th May, and on several subsequent days when I tried to count them. A week later they increased again to about twenty pairs, and approximately that number remained to nest, or to attempt it, for many of the nests were destroyed by the floods from the 23rd May onwards. At the end of June a further considerable increase in numbers took place, apparently of birds drowned out some-

where else, which had abandoned further nesting operations for the season, and from this time onwards there were probably nearer a hundred than fifty birds on the water. The first young were hatched on 5th July from a nest on boat-house channel. Two more broods came off on Lady Island the next day. Each of these produced six young, the nests on Lady Island having contained only six and seven eggs respectively, all having hatched. A few days later seven young were brought off in Heslop's reeds, and other broods were nearly as numerous when I left. This is in strange contrast to the Pochards, which have only broods of one, two, three, and four young at most. One Tufted Duck's nest which I had located was still unhatched on 10th July, when last visited, and others were still incubating a week later. By 6th July most of the drakes had begun to loose their powers of flight, having a week or so previously gone into eclipse plumage, but a few were still flying, and in drake's plumage, on the 18th July.

GOLDEN-EYE.—There were several on the Mere on 20th April and the following few days. A pair—the drake in full plumage—on the 26th; on 27th a flock of twenty-seven immature, one or two of them males in 'patchy' plumage; twelve in another flock on the same date, eleven of them being adult drakes! None were to be seen the next day, nor later.

SCAUP DUCK, COMMON SCOTER, and GOOSANDER have all been occasionally observed, and shot, on the Mere during winter. There are, of course, several other birds, not mentioned in this paper, which occur at the like season, but a passing reference to the above may not be without interest.

WOOD PIGEON.—Numerous, and here called 'Stockie.'

STOCK-DOVE.—Also numerous, nesting in hollow trees, in several cases ousted by Jackdaws, but resumed possession of the holes after the intruders had been shot.

TURTLE-DOVE.—There has usually been a nest or two at Wassand, but none this year, though a pair—perhaps more—were breeding at Sigglesthorne, only a mile or so distant. I saw a single Turtle-Dove fly into the Low Wood on the 21st April, but no more till the 21st May, when again a single bird appeared, flying over Boat-house Wood. Taylor heard one cooing in Fisher Wood, west of the park, on 23rd May, and again in the park on the 7th June. These were the only instances this year.

PHEASANT (no artificial rearing done now) and **PARTRIDGE** are both fairly numerous, and would be plentiful but for foxes.

RED-LEGGED PARTRIDGE.—One or two have sometimes been shot, but none seen this year.

QUAIL.—Has occurred; but none this year.

LANDRAIL.—Usually a few about, but none heard this year; nor did I hear of one.

SPOTTED CRAKE.—One found dead on the side of the Mere, in early autumn, a few years ago, was the only one Taylor had seen or heard of; but of course such a bird, in such a place, is very likely to be overlooked. A pair bred this year in Heslop's reeds. I first heard the call-note on 29th May, across the Mere, in advanced twilight, and again many times during the following week or so, at dusk and dawn, always proceeding from the same spot. By 7th June the calling had almost ceased. On the morning of the 8th June I waited from 2 a.m. to hear it, in vain till about 3-45, when a fox ran into the reeds and started the bird calling, and it kept on for about ten minutes. The note is audible a long way off; in calm weather a mile or more. Standing talking to Taylor near his cottage, about midnight on 5th June (a dull, misty, but calm night) I could distinctly hear the Crake calling, and took the trouble of following the sound right down to Heslop's reed-bed, in order to be sure that it was the bird 'singing' in its accustomed place. The distance, as I afterwards measured it upon Captain Constable's 25-inch Ordnance sheet, was 1833 yards in a direct line. The bird was not heard again till 15th July, when, in early dawn, I was in the boat just outside the reeds, and it suddenly called, rather low, quite close to me. It was almost immediately answered by low notes of *twit-twit*, evidently from several young ones close at hand, though it would have been little short of a miracle had they been seen in the thick covert. I had no doubt, however, of their presence, nor of their identity, the note of the adult being easily recognised and the young evidently responding to it.

WATER-RAIL.—Numerous here and always has been so, and is even more common in winter than summer. Some years ago a friend of Mr. Constable's, wishing to obtain some eggs, spent a morning in the Low Wood, in spring, before the herbage had grown dense, and when the ground used to be much drier than it is now, and found five nests with eggs. This year, not having any particular occasion to find a nest, I did not go much about in the likely places, and only actually saw one, but the birds were being constantly heard and seen in many places round the Mere, and there were numbers of broods.

WATER-HEN.—Common, of course, but not so numerous as might be expected. Foxes levy a heavy toll on them and their usually easily accessible nests.

COOT.—Of course numerous, but not excessively so. They do much harm to the crops in the fields bordering the Mere, and many are shot by the farmers. Last winter they had a

formal coot-drive one day and killed about ninety. The bird has not a good reputation here in respect to other wild-fowl and their nests and young. I saw two nests, each with a single egg, on 21st April, and another with two eggs; and by the end of the month many were incubating on from four to seven eggs. In some later nests eggs were more numerous, one with eleven being seen, and another with nine. Several broods hatched by 12th May, but the majority were about a week later, and eggs were still numerous—many of them fresh—up to beyond the middle of June. Many nests were washed out and destroyed by floods and the gale on 23rd May. Early in July the majority of the adults had lost their quills, and were unable to fly, and the noise a flock of them made in flapping to the shelter of their reed-beds, on the appearance of a boat, was remarkable, and might be well described as 'a scutter of coots.'

STONE CURLEW.—Taylor has seen an occasional bird in former years, and this year I saw one on 2nd May in a field of late oats near Heslop's reeds, and judging from the cries after it had disappeared behind the small hill there, it was probably not alone.

RINGED PLOVER.—A pair was seen on Holmes's promontory, where there is a shingly beach, on the 11th and 13th May, and there was an occasional bird there, and on the south side of the Mere, during the next few weeks; but no nests.

PEEWIT.—A pair or two breed in fields adjoining the Mere, but they did not arrive and begin to nest till quite late. The first were seen on 2nd May, and young were not hatched until June.

OYSTERCATCHER.—One was seen flying over the Mere on 15th May.

WOODCOCK.—None were seen by me. Last year there was one nest at least at Wassand, and possibly two, but none this year. Sometimes they are numerous round the Mere in winter.

SNIFE.—Not known to have bred here and never heard drumming. Almost any day, however, from 20th April to 11th May, one or two could be flushed from certain parts of the Mere side, but there was no appearance of nesting. I saw four on 21st April, and two—not together—on 11th May. Sometimes the birds were in pairs, but as often not. On 9th July a single bird was seen flying over the Mere in early dawn, the first since 11th May, but no more up to the time I left.

DUNLIN.—One, with full black breast, was at the Hornsea end of the Mere on 4th May, and a pair, also in summer dress, was there on the 11th, and again (on the south side of the Mere) two days later. On 2nd July an immature bird was seen near Hornsea Bridge. There were no nests.

SANDERLING.—One in full summer plumage was seen on the sea beach at Hornsea on the evening of 21st May.

SANDPIPER.—Not known to have bred on the Mere, and did not do so this year, although a pair took up a position at the bathing-house, apparently quite suited to their requirements, and seemed to be intent on breeding. Why they did not do so was not very apparent, and it may possibly have been due to the foxes. The first seen was a single bird on 6th May. A pair was at the bathing-house next day, where they remained till the 23rd, after which they seemed to wander away. There was a second pair at the Mere End at Wassand on 23rd May, but no more were seen till 9th July, when two flew past together, but did not alight in view and were not seen again.

REDSHANK.—Though not known to have nested here, these birds are seen every autumn, but not usually so early as this year. None bred this year on the Mere side, but perhaps may have done so not very far away. I saw a single bird at the Hornsea end on 1st June, and one at the same place a few days previously, and an occasional bird is well known there. A party of half a dozen was at the Wassand bathing-house on 22nd June, one at the boat-house on 1st July, and considerable numbers were calling overhead on and about 18th July.

CURLEW.—Many were heard passing over at night on 20th April, and seven were seen flying together over the Mere on the early morning of 20th June, and again several on the nights of 22nd and 23rd, but Taylor was surprised to see and hear them so early in the season. Many were calling from overhead on the 11th and 12th July, and occasionally up to the 20th.

WHIMBREL.—A solitary individual was on the Mere side at Hornsea on 4th May, and another flew whistling over on the 19th.

The **BLACK TERN** was not seen by me, nor by others this season, but from descriptions it appears to be a not very unusual visitor to the Mere in autumn, and it is usually seen at the Wassand end.

SANDWICH TERN.—I saw two adults flying together over the Mere, looking for fish, on 30th April, and they passed quite near to me.

COMMON TERN.—Not unknown as an occasional visitor to the Mere. A very tame individual, in adult plumage, fished about Holmes's boat-house, and rested on his boats and staging, for a few days prior to 14th May, when I took several photographs of it, and again on the 17th. It remained a few days longer and then disappeared.

BLACKHEADED GULL.—Formerly bred here, but not for many years past. None were seen in April this year, but two pairs arrived on 1st May, after which one or two, and

sometimes a dozen or more, were often to be seen on the Mere.

COMMON GULL.—A pair or two of adults are seldom absent from the Mere, and there are often a few immature birds about. Three adults were here on 21st April, and several on 1st May and other days.

HERRING GULL.—Never absent during my stay, when large flocks often arriving and departing, Flamborough way; washing themselves in the Mere, sitting on neighbouring fields, fishing, etc. There were both adults and immature birds, the former being the more numerous.

LESSER BLACK-BACKED GULL.—Very frequently seen with the Herring Gulls, both adults and immature; seldom less than a few pairs about the Mere, most of them being in nearly mature dress—probably in their last year of adolescence.

GREAT BLACK-BACKED GULL.—On 1st May two pairs were on the Mere, one nearly adult, the other not quite so far advanced. Four similar birds were seen again on 25th May. Others, or the same birds, were noticed at different times later, but there were never more than four together, and no adults.

KITTIWAKE.—A young bird, alone and very tame, was on the Mere on 22nd April. It was not seen again, nor were any others.

GREAT CRESTED GREBE.—There have always been a few nests of these on the Mere. About thirty years ago there were only a pair or two of the birds, but under Taylor's protection they have increased, and some ten years later there were eight nests in one season, a record that has not since been equalled. Latterly, there has seldom been more than three nests. There were at least three pairs, and probably four, of the birds on the Mere this year when I arrived on 20th April, and in any case the number very soon increased, for a month later there were six or seven pairs at least. I saw only four nests with eggs, but not wishing to disturb the place unnecessarily, I never systematically hunted for them, and it was scarcely more than accidentally that those seen were found. One of the nests was at the Hornsea end of the Mere, in the bed of 'flagging' opposite the outlet—a site that is generally tenanted by at least a pair of the birds. Another was off the Heronry Wood, and the remaining two in Heslop's reeds, within fifteen yards of one another. The bays of the latter reed-bed have always been the most favoured nesting site, several nests being sometimes seen here in close proximity to each another. In addition to these four nests I saw the newly-hatched young—four of them—from a nest near the entrance to the boat-house channel, and I was aware that there was another in the bay behind the Lady Island, and a

seventh on the margin of the Round House reeds. There was, I think, yet another pair of birds on the Mere, and I can confidently say that at least seven pairs attempted to nest this year, and that five of them, at any rate, succeeded in hatching their young, despite the very unfavourable weather conditions. From these five, nineteen young were duly hatched and left the nests. Whether they all survived, or how many of them did so, it was impossible to say, as up to the time I left they never appeared to quit the shelter of the reeds, and it was only by long and patient watching that any of them were seen. I rather feared that at least some of them must have met an untimely end, but from his previous experience Taylor looked forward with confidence to seeing them abroad after they had grown older.* It will not be overlooked, however, that, if they lived, the first-hatched brood must have been about nine weeks old by the 20th July, another seven weeks, and the youngest of the five more than a month.

I do not know what is the normal period of incubation with this species, nor whether that period is known to be liable to considerable fluctuation, depending perhaps on the temperature of the nest, climatic conditions, and so forth; but my experience with regard to three of the above nests was interesting. The first nest seen was in Heslop's reeds, and this I watched the birds building on the afternoon of 21st April. I rowed past the nest a few days later, but did not push into the reeds to interfere with it, as it did not appear to contain eggs, and I felt sure that it could not do so. On 1st May I went to look at it again, and then found that it contained four eggs, three rather dirty, one white, and, I concluded, therefore, fresh. I took some photographs of it and left it. It was seen in the near distance from time to time during the next ten days, and incubation was proceeding in a normal manner, but on 12th May, when I took Mr. Booth to see it, the nest was found to be empty, and I feared some ill must have befallen the eggs. There was, however, nothing to suggest this, and the nest was a good deal paddled down, as though it had been recently occupied, and it still remained warmer than the surrounding water. I did not think there had been time for the young to have hatched, but it is almost certain that they were, for I do not think there was any other such early nest in the vicinity, and next day the 13th, when I spent a considerable time in watching the place; I saw two young grebes there with their mother, and no doubt there were

* This expectation was not fulfilled. On 12th November, Taylor writes me that he had only seen two young this year.

more which were not visible on account of the thick herbage. I saw them again on the 15th (two if not three of them), and again on the 25th, and on 11th June I watched a male fishing for some time just outside the reeds, and saw him catch and carry a small fish of about an inch long into the reeds, no doubt for the young, although these were not seen that day. He had previously made several other journeys to the reeds, apparently with food too small for my glasses to detect. The second nest in Heslop's reeds was seen on 12th May, when it was certainly empty. Four eggs were afterwards laid and the bird began to sit on the 20th. When I went to look at it on 11th June two eggs had already hatched, and the young had taken to the water, diving near the nest, while the other two eggs were both chipped and young distinctly cheeping in them, and they were safely hatched later. The third nest, at the bottom of Heronry Wood, had two eggs, both rather dirty, when I first saw it on 25th May. On the 28th it had four eggs, and the old bird was beginning to sit. On 12th June it was found to have recently hatched. I was not prepared for this, and it was only casually that I happened to look at it that day, but all the four eggs had hatched, as demonstrated by the remains of their shells. The nest at the Hornsea end of the Mere had three eggs, then a little incubated, on the 8th June, and it hatched off a day or two previous to 21st June. Four recently-hatched young, from a fifth nest near the boat-house, were seen on 25th May, when they were not more than a day or two old. The apparent discrepancy in the periods of incubation is very remarkable, but there is no doubt of the facts as above stated. In one case it was certainly twenty-two days; in another apparently only sixteen or seventeen days at most; and in a third it would seem to have been even three or four days shorter.

The 'seaworthiness' of a grebe's nest is well known, but it was so well illustrated at Hornsea this year that I am tempted further to enlarge upon it. On 22nd May, as already stated, we had a heavy rain all day, with a strong easterly wind; the 23rd was also very wet, with half a gale blowing from east to north-east, clearing up in the afternoon. More than an inch of rain apparently fell at Wassand. On the afternoon of 23rd I walked down to Hornsea and persuaded Mr. Holmes to open one of the sluice-gates, thus somewhat relieving the pressure, but the Mere was much flooded, all the ditches running very full, and more water was coming in than this allowed to escape. At the Boat-house the water was on the 23rd standing fully five inches above its level two days previously. As a natural consequence many nests were flooded, the wash of the storm assisting materially in the destruction of Coots' nests, etc. The Grebes' nests in

Heslop's reeds were built not more than two inches above the water at its low level, and they were, moreover, from their situation on the northern margin of the reed-beds, subjected to almost the full force of the 'lipper' raised by the storm; but they rose with the water, and on the 23rd both the empty (hatched) nest, and that containing eggs, were found to be still above the flood. Upon the one containing eggs the Grebe was seen calmly 'riding the storm,' with considerable wavelets breaking against her, and she weathered it in safety, though a coot's nest within a few yards of her—more sheltered than she was, which originally stood about a foot higher than her humble home—was completely washed out and destroyed, along with many others elsewhere, and a like fate overtook even a Swan's nest ten or fifteen yards further back in the reeds, and therefore much less exposed to the storm, and about a like distance from the sitting Grebe. I took the boat in to make sure of the facts, and found the grebe's eggs almost awash with every wave, the nest barely half an inch clear of the water, and at the same time I picked up floating eggs of coots and swan close to it.

Similar observations were made upon the Heronry Wood nest later, it also rising with the water, and being saved, while other nests perished round it, though they were there not so much exposed to the gale as those on the south bank of the Mere. From experiments I made, I believe the Grebes may themselves assist materially in the floating of their nests, by mechanical means, when occasion arises.

DABCHICK.—There has usually been a nest or so on the Mere every year, but this season there was certainly none. Mr. Wade saw a single bird when he was taking me round the Mere on 21st April, and I heard one calling the same afternoon, but no more were either seen or heard during my stay.

On 23rd May Mr. Holmes reported that a small Gull had been about his place during the storm of the previous day. He described it as being 'pure white, without any black on head,' and it was smaller, he thought, than the Common Tern that had lately been frequenting the neighbourhood of his boat-house. It had disappeared before I heard of it, however, and was not seen again.

About the beginning of June some of the workmen at Wassand tried to describe to me 'a very bright-coloured bird' which had settled for a minute or two on the pathway in the yard quite near the blacksmith's shop and which had been seen from the windows. It was said to have been very gay in colour—red, green, and blue—and a little larger than a Kingfisher, but I could make nothing of it.

On 30th May I saw two ducks together, along with some

Mallards, Shovelers, etc., near Holmes's promontory at Hornsea, which I could not identify. They were very dark, showing almost no light in the wings or underneath, and were not much larger than Teal. I set them down as 'escapes', and certainly not 'British.' They were not seen again.

On 24th May, and for some time later at intervals, I listened to a song on the landward border of Heslop's reeds about which I could not satisfy myself. It was, I think, the note of a Crake of some kind, but had a very curious Bunting-like 'lilt' about it, and if it belonged to either the Water-Rail or Spotted Crake—both of which were nesting and calling thereabouts—it was a note I had not previously heard, and one which I did not think belonged to them. To commit a bird's song to paper is no easy task, so much depending upon the reading and intoning of the words by different people, but in my journal I entered this one as *tick-tick-tick, ting, ter-r-r-r*, repeated at intervals, with a cadence strongly recalling the song of a bunting. It was, however, uttered by some bird from the densest of the herbage.

APPENDIX.

Captain Bethell, R.N., kindly gave me the following note of his rainfall records at Siggleshorne; for comparison, some of the figures from the two previous years being added.

The fall is in inches and decimals, and for the weeks beginning with the dates given. The records for the earlier periods of 1910 and 1911 had unfortunately been mislaid.

1910.		1911.		1912.	
..		..		April 21 fall	0.00
..		..		8	0.06
..		..		May 5	0.15
..		..		„ 12	0.94
..		..		„ 19	2.01
..		..		„ 26	0.42
..		June 5	0.00	June 2	1.48
June 13 fall	0.00	„ 12	0.75	„ 9	1.37
„ 20	0.68	„ 19	1.88	„ 16	0.51
„ 27	0.99	„ 26	1.34	„ 23	1.55
July 4	1.08	July 3	0.22	„ 30	1.42
„ 11	0.01	„ 10	0.00	July 7	0.24
„ 18	0.57	„ 17	0.09	„ 14	0.63
„ 25	0.88	„ 24	0.00		

INCOME AND EXPENDITURE STATEMENT, 12 months to November 30, 1912.

INCOME.			EXPENDITURE.		
	£	s. d.		£	s. d.
Members' Annual Subscriptions ..	112	0 6	Expenses of Meetings	4	18 9
Levies from Associated Societies ..	13	19 1	Printing and Stationery (General A/c)	21	1 1
Special Appeal Fund. (<i>contra</i>) ..	2	2 0	Postages, etc. (Hon. Secretaries' A/c)	13	18 10
Life Members' Subscriptions (<i>contra</i>)	16	15 6	Clerkage (Hon. Secretaries' Account)	10	0 0
Sales of Publications—			Printing and Stationery (Hon. Treasurer's Account) .. .	0	12 6
Baker's North Yorkshire ..	2	2 0	Postages (Hon. Treasurer's Account)	1	13 2
Lee's West Yorkshire ..	1	1 0	Cost of Publications:—		
Porritt's Lepidoptera ..	0	11 4	Annual Report, 1911 ..	£5	7 8
British Arachnida ..	0	1 0	" " 1912 (est.) ..	6	0 0
	3	15 4		11	7 8
Sundries .. .	1	2 3	Less—Provision in A/cs for 1911 .. .	8	0 0
				3	7 8
Naturalist"—	£	s. d.	Special Appeal Fund (<i>contra</i>) ..	16	15 6
Subscriptions ..	95	0 0	Life Members' Subscriptions (<i>contra</i>)	16	15 6
Sundry Sales ..	0	11 10	"Naturalist"—		
Recognition fee ..	5	0 0	Subscribers ..	£99	19 3
	100	11 10	Life Members' Copies ..	6	15 0
			Exchanges ..	2	15 0
			Binding and sundries ..	2	5 8
			Postages ..	7	12 3
				119	7 2
			Balance, being excess of Income over Expenditure during 1912 ..	56	9 10
	£250	6 6		£250	6 6

BALANCE SHEET, November 30, 1912.

LIABILITIES.			ASSETS.		
	£	s. d.		£	s. d.
Amounts due from Union—			Cash at Bank .. .	136	1 9
"Naturalist" ..	114	6 10	Cash with Hon. Sec- retaries .. .	5	0 0
Annual Report, 1911 ..	5	7 8		141	1 9
Sundries (Printing, etc.)	25	19 6	Less : Cash due to Hon. Editor ..	2	2 3
	145	14 0		138	19 6
Annual Report, 1912 (estimate) ..	6	0 0	Subscriptions in Arrears,		
Subscriptions received in advance	3	13 6	1912 ..	27	16 4
Life Members' Account ..	45	18 0	" " 1911 ..	1	8 3
"Hey" Legacy Account ..	20	0 0		29	1 7
			Less : Amount written off as unrealisable ..	10	3 4
Audited and found correct,				19	1 3
JNO. W. STATHER,			Balance, being excess of Liabilities over Assets,		
J. FRASER ROBINSON,			Dec. 1st, 1911 ..	133	9 1
9/12/1912.			Less : Income in excess of Expenditure during 1912 ..	56	9 10
				76	19 3
	£221	5 6	Less : Special Appeal Fund	13	14 6
				63	4 9
				£221	5 6

NOTE:—The Union has a stock of Publications, and there is also a liability on Life Members' A/c, not included above.

2/12 12.

H. CULPIN, *Hon. Treasurer.*

Naturalist,

A YEAR'S SCIENTIFIC WORK :

BEING

THE YORKSHIRE NATURALISTS' UNION'S FIFTY-FIRST ANNUAL REPORT, FOR 1912.

Presented at Hull, 14th Dec., 1912.

THE ANNUAL MEETING AND FIFTIETH ANNIVERSARY OF THE UNION was held at Heckmondwike, the town of its inception, on the 16th December, 1911.

The Naturalist, for February, 1912, contained a report of this successful meeting, and the Presidential Address of Mr. Alfred Harker, M.A., F.R.S., F.G.S., on "Petrology in Yorkshire," appeared in that journal for February and March.

The FIELD MEETINGS for the year have been five in number, full reports of which have appeared in *The Naturalist*, and these reports have had an added interest given to them by illustrations. The excursions were as under :—

Yorks. S.E.—4th May, Riccall Common.

„ N.E.—25th-27th May (Whit Week), Bridlington.

„ Mid-W.—15th June, West Tanfield for Hackfall.

„ S.W.—11th July, Askern for Shirley Pool.

„ N.W.—3rd-5th August (Bank-Holiday), Tebay.

„ N.E.—28th September to October 3rd (Fungus Foray) Sandsend for Mulgrave Woods.

The Marine Biology Committee met at Robin Hood's Bay, 11th-15th October.

Excursion programmes have been printed and distributed prior to each of these Field Meetings. The best thanks of the Union are due to the various Landowners who so kindly granted facilities and privileges ; and also to the Railway Companies for a continuation of cheap travelling facilities.

EXCURSIONS FOR 1913 will be as follows :—

Yorks. S.W.—Maltby (Easter), March 22nd to 24th.

„ N.W.—Kirkby Stephen (Whit Week-end), May 10th to 12th.

„ Mid. West.—Burnsall, Saturday, June 7th.

„ S.E.—Stamford Bridge, Saturday, July 5th.

„ N.E.—Great Ayton, August Bank Holiday week end), August 2nd to 4th.

„ N.E.—Fungus Foray, Sandsend for Mulgrave Woods, September 20th to 24th.

The ANNUAL MEETING for 1913 will be held at York by the kind invitation of the York Philosophical Society.

THE AFFILIATED SOCIETIES.—The number of these Societies is now 38 having a total membership of 2925. The Earby Naturalists' Society has been the only addition during the year.

THE MEMBERSHIP OF THE UNION now stands at 403.

The following new members have been elected during the year :—

Mr. J. C. Barker, Northlands, Walkington, Beverley.

Mr. Jonas Bradley, Stanburg, Haworth.

Miss E. Branson, Girls' Grammar School, Normanton.

Miss M. Booty, M.A., The High School, Selby.

Mr. J. Digby Firth, F.L.S., F.E.S., Leeds Modern School, Leeds.

Miss E. Howlett, 75 Selborne Street, Liverpool.

Mr. Albert Megson, Fern Villa, Headlands, Ossett.

Mr. John Mennell, 27 Neville Street, York.

Mr. Richard Slack, Heather Cottage, Kildwick, via Keighley.

Miss Edith Silcox, 31 Wheatley Lane, Ben Rhydding.

Mr. John Wm. Stones, F.R.G.S., 7 High Street, Staveley, Chesterfield.

Mr. Thomas Charles Turner, Regent House, Anlaby Road, Hull.

Mrs. Warde-Aldam, Frickley Hall, Doncaster.

Earby Naturalists' Society.

OBITUARY.—It is with regret that we record the death of the following members during the year, viz., Rev. Canon Fowler, M.A., P. Fox Lee, R. H. Philip, and Thomas Newbitt, F.G.S. 'In Memoriam' notices of these gentlemen have appeared in *The Naturalist*.

DIVISIONAL SECRETARIES AND LOCAL TREASURERS.—As in past years these gentlemen have rendered valuable services in their respective spheres of office and the thanks of the Union are due to them. They have been re-elected.

GENERAL COMMITTEE.—The following have been added to the permanent General Committee :—

Prof. W. Garstang, M.A., F.Z.S., Leeds.

W. B. Haley, Heckmondwike.

J. F. Musham, F.E.S., Selby.

S. H. Smith, Heworth, York.

WINTER LECTURE SCHEME.—In accordance with the instructions of the Executive, the List of Lectures issued in 1906 has been revised by the Secretaries, and will be issued to the affiliated Societies early in 1913.

VERTEBRATE SECTION.

WEST RIDING REPORT.—Mr. Riley Fortune, writes :—
Summer migrants were, if anything, a little later than the

Naturalist,

average dates in arrival, with the exception of the Swift. Many species were very scarce; this was especially noticeable in the ranks of the swallow tribe and some of the Warblers, the Willow Warblers especially. Some localities which usually abound with them, were almost devoid of their lively presence. The Wood Warbler, which arrives at a later date was, however, as abundant as ever. Spotted Flycatchers were very late indeed, but eventually turned up in full numbers. Corn Crakes too were plentiful.

The nesting season has been an unfortunate one, especially for ground-breeding birds, many nests having been destroyed by the cold and excessive wet. Partridges, in some localities, suffered very heavily. In one wood I found several nests of tits drowned in the nest boxes put up for their convenience.

The moorland birds, Curlews and Golden Plovers, behaved in a peculiar manner. They arrived at their breeding haunts about the usual time and were about the moors for a week or ten days, when the severe weather drove them into the lowlands, where they were found in flocks at the time they should have been busy with family matters. Nesting Snipe have been unusually plentiful.

One noticeable feature has been the increase in the number of White Wagtails in Wharfedale and Airedale. The late stay of Swifts is also worthy of remark.

Many interesting notes have appeared during the year in *The Naturalist*, and a fuller report will be sent later.

THE EAST RIDING.—Mr. E. W. Wade writes :—The season 1912 has been as remarkable for the prolonged rains and absence of sunshine as its predecessor was for a record spell of hot dry weather, and the contrasting effects of the two upon bird life afford much interesting food for comparison.

Owls, the Long-eared Species in particular, have scarcely bred at all in the East Riding, the birds being still in flocks at the end of April. The Tawny Owl was more fertile, but many non-breeding pairs were hanging about the usual haunts all the spring. The Barn Owl bred late and laid small clutches. The non-breeding of the resident species of Owls in an unfavourable season is effectually proved. In searching for the cause of this infertility one is driven to the conclusion that the excessively wet autumn and winter had killed off the mice, and their food supply being scanty, interfered with the production of offspring.

On the other hand, Rooks, Crows, and the Corvidae generally bred early and produced full clutches, the sunny April and May evidently giving them a plentiful food supply. The first young Rooks were shot on 27th April.

The other partially migratory species were well up to the usual nesting dates. Blackbirds commonly reared three broods,

and Robins, which were exceptionally early with their first broods, in many cases reared a second.

Migrants arrived on the average slightly earlier than last year, and commenced breeding in good time, and some of them, *e.g.*, the Common Whitethroat, after their second broods had been destroyed in June, were generally in full song and apparently breeding in mid-July.

The ground breeders, Skylark, Titlark, Whinchat, etc., were completely driven from their nesting grounds, and had almost disappeared from our meadows in the summer months.

Warblers, said to be scarce in some localities, appeared in the usual numbers, but the cold wet summer seems to have driven off some of the later migrants.

The Spotted Flycatcher was particularly late in appearing, and scarce, while Swallows, House Martins and Swifts were below the average number. The Swallows and House Martins reared two or three broods, but many young perished when fully grown.

The Whinchat, Lesser Redpoll and Goldfinch, remain the scarcest of our small birds, and must continue so until more vigorous efforts are made to stop the depredation of the professional birdcatcher.

The season for game birds opened full of promise and ended in disaster. Pheasants and Partridges laid early and large clutches, and the latter, which had almost disappeared from our Holderness claylands, appeared again in greater numbers than for many years, no doubt owing to local migration from the wolds, but nearly all the young were destroyed, hatching eggs being floated out of the nests in some localities. In only one part of Holderness have coveys of young birds been seen. The season is the worst since the record of 1878 when the wet, though not lasting on through July and August, wiped out the young broods of partridges even more effectually than in the present case.

The Stone Curlew has again been specially protected on the Wolds, and has held its own, while there is room for hope that a slight increase has taken place in the number of young reared.

Spurn and Hornsea are dealt with under the Protection Committee's report.

BEMPTON.—The weather has seriously interfered with egg-gathering, and the climbers believe that, apart from the scarcity produced by irregular climbing, eggs have not been so numerous as last year.

Of rare visitors, the immigration of the Little Auk in February, already fully reported in *The Naturalist*, has been the most remarkable.

An immature Black-tailed Godwit was shot on the Humber on 3rd February.

Two Slavonian Grebes in immature plumage were shot on Sunk Island on 17th February, and two more were observed

THE NORTH RIDING.—Mr. T. H. Nelson, writes:—Redcar, like other East Coast towns, received its share of the incursion of Little Auks in the early part of the year. There had been strong 'easterly' weather for several days when, on January 20th, my wife saw about forty Little Auks, in small parties, flying low down near the water just beyond the breakers. One lot of these came within five yards of where she was walking, and she noticed they uttered a short little note; another lot of five also passed close by her, and another alighted on the sea near a wrecked steamer. Later in the day she found a very fine specimen washed up at high-water mark. After this date numerous examples of these little visitors were found; one man picked up a dozen in the course of a mile walk, and the local bird-stuffers had scores brought to them. On February 1st a blizzard of arctic severity, with a north-easterly gale, swept the coast, continuing for three days. Hundreds of Little Auks were seen flying before the storm, and many were found on the beach between Saltburn and Teesmouth. Reports of 'rare Arctic birds' were also sent from inland places remote from the coast, along the foot of the hills, and the villages between the coast and the moorlands. For a precedent for the invasion of this little northern sea-fowl we must look back to the year 1895. An extraordinary flight of Brent Geese occurred during the storm in February; large flocks were noticed crossing the rocks on the east of the town, where a shooter, with an ordinary 12 bore and No. 5 shot, bagged eight birds one morning.

On January 18th, an immature male Smew was shot at the Teesmouth, and a fine adult example of the same species was obtained in a marsh in the neighbourhood on the 25th. The duck tribe was well represented; Scaup, Golden-eye, Tufted, Wigeon and Mallard were very numerous; and for several days I noticed two Scaup drakes and a duck on a small pond a few yards' distance from my house.

The Hawfinch continues to increase in the localities referred to in 'The Birds of Yorkshire.' A considerable addition is also noted in the numbers of nesting Nuthatches in a preserved park on the Cleveland Hills. A great Skua was recorded near Redcar on September 12th, and, on October 3rd, a Baillon's Crake (female) was obtained by Mr. J. M. Charlton on some marshy ground at East Harlsey, near Northallerton. The usual shore-birds appeared at the Tees estuary in August and September, and the autumn migration has been in full force since the beginning of October. Lapwings, Skylarks, Fieldfares and Redwings have been crossing almost daily; an immense flight of Hooded Crows was seen on the 18th; on the same day I flushed a Woodcock in my garden, and this species

with two Little Auks were seen on 18th October, an unusually early date. Water-rail, Snow Buntings, and Shore-larks were observed on the 21st. Two Fork-tailed Petrels were picked up near Thirsk.

MAMMALS, REPTILES, AMPHIBIANS AND FISHES COMMITTEE.—The most important occurrence reported is that of the Marten near Hebden Bridge, identified by Mr. H. B. Booth, which if truly wild will most probably be the last Yorkshire survivor of the species.

Numerous other interesting records have been sent in. Mr. A. Whitaker refers to the decrease in number of bats near Barnsley since the cold spring of 1908. Mr. Rosse Butterfield notes Natterer's Bat at Stanbury, near Keighley, and Mr. H. B. Booth the occurrence of the Whiskered and Daubenton's at Hornsea Mere. The Pigmy Shrew is reported from Brompton Moor by Mr. W. J. Clarke, and from Holden Ghyll by Mr. Rosse Butterfield. The great abundance of Short-tailed Voles about York is noted by Mr. Oxley Grabham, and the increase of Hedgehogs in Wharfedale, by Mr. H. B. Booth. A Shoal of Porpoises at Selby, and the presence of Otters at Menthorpe Ferry, Turnhead Reach and Drax, are noted by Mr. J. F. Musham.

A Common Rorqual, 28 feet in length, which had evidently been dead for several weeks, was washed ashore near East Scar on 11th September.

Of Reptiles, the Palmated Newt is recorded by Mr. W. J. Clarke, on Whitby Moors, and a Grass Snake at Low Moor by Mr. H. B. Booth.

As to Fishes, Mr. H. B. Booth records the appearance of numbers of small Perch in the area of the Wharfe, which was last year depleted of Trout, Barbel, Grayling and Eels by ammoniacal liquor; and notes on the Salmon Fisheries of the Ouse are given by Mr. Grabham and Mr. Musham.

Mr. R. Fortune supplies a list of large fish obtained in the County during the year, the most notable of which is a record Roach weighing 2lbs. 13½oz. from Hornsea Mere, a Pike of 23lbs. 10oz, from Huttons Ambo., a Grayling of 2lbs. 5½oz. from Malton, and Bream of 5lbs. 6oz. from Woolley dam. He also reports the occurrence of the Salmon in the Upper Nidd.

Of marine fishes, Mr. W. J. Clarke records several occurrences Porbeagle Sharks stranded near Scarborough, the Spotted Goby and Fatherlasher on the same coast, plenty of Planer's Lamprey in the Derwent, at Forge Valley, etc.; a Short Sunfish at Filey, and a curious colour-variety of the Plaice at Scarborough are the most notable.

WILD BIRDS' AND EGGS' PROTECTION COMMITTEE'S REPORT, 1912.—The amount received in subscriptions for 1912 is £28 2s.,

which, together with the balance in hand, made a total fund of £56 11s. 4d. The expenditure amounts to £31 15s. 6d., leaving a balance in hand of £24 15s. 10d.

The birds in the sanctuaries under our care have done well despite the bad season.

The birds at Spurn have had a good season ; a year or two ago all the nests on the point were overwhelmed and buried by a sand-storm. Subsequently the Terns practically deserted the point and took up their quarters on the coast near Kilnsea Beacon where they have returned this season. It is estimated that at least 80 pairs have nested there, about 4 pairs nested on the point and 10 pairs on the sea side of the promontory, halfway between Kilnsea and the point, about 8 pairs also nested halfway on the Humber side. The birds arrived a little late, but nesting operations commenced and finished about the average time.

Ring Plovers have increased considerably and are now exceedingly common, nesting on both the sea and the Humber sides and also among the bents.

At least two pairs of Oystercatchers nested, but the nests were not found with eggs until well into June ; probably the first clutches were taken by gulls.

The Redshanks and Sheld Ducks nested again.

It is a pleasure to report that the Stone Curlews show a slight increase in numbers and that all hatched their young out. In one locality the first birds were hatched on June 12th. They were, however, earlier in the other colony.

Hornsea Mere has been in charge of Mr. George Bolam, whose excellent book on 'The Birds of Northumberland and the Eastern Borders,' was published while he had charge of our sanctuary. Mr. Bolam's exhaustive report is being published as a supplement to *The Naturalist*, through the kindness of our President, Mr. W. H. St. Quintin, and our publishers, Messrs. A. Brown and Sons.

Mr. Wade reports :—The Peregrines at Bempton have been unfortunate, they nested in the old locality, and in the third week in May the eyrie contained one young one and an egg containing a dead bird fully developed. The nestling seemed delicate and soon disappeared. As no one was allowed to interfere with them, it is supposed that it died from natural want of vigour or fell off the ledge.

We have had several cases of infringement of the Wild Birds' Protection Acts through our hands and in each case the culprits have been fined. The police co-operated with us in each case.

RECEIPTS FOR 1912.						£	s.	d.
Right Hon. C. J. Milnes Gaskell	..	..	..	..	..	10	0	0
W. H. St. Quintin, Esq.	..	..	..	..	..	5	0	0
J. Atkinson, Esq.	..	..	..	..	..	1	1	0
Dr. Bishop	..	..	..	..	..	1	0	0
H. B. Booth, Esq.	..	..	..	..	..	1	1	0
Leonard Gaunt, Esq.	..	..	..	..	..	1	0	0
Oxley Grabham, Esq.	..	..	..	..	..	1	1	0
Claude Leatham, Esq.	..	..	..	..	..	1	1	0
Digby Ledgard, Esq.	..	..	..	..	..	1	1	0
G. T. Porritt, Esq.	..	..	..	..	..	1	1	0
W. Denison Roebuck, Esq.	..	..	..	..	..	1	1	0
Mrs. Edward Cox	..	..	..	..	..	0	10	6
R. Fortune, Esq.	..	..	..	..	..	0	10	6
A. Haigh-Lumby, Esq.	..	..	..	..	..	0	10	6
E. W. Wade, Esq.	..	..	..	..	..	0	10	6
York Field Naturalists' Society	..	..	..	..	..	0	10	6
Johnson Wilkinson, Esq.	..	..	..	..	..	0	7	6
W. H. Parkin, Esq.	..	..	..	..	..	0	5	0
S. H. Smith, Esq.	..	..	..	..	..	0	5	0
E. Wilfred Taylor, Esq.	..	..	..	..	..	0	5	0

						£28	2	0
Balance brought-forward from 1911..	..	..	..	..	..	28	9	4
						56	11	4

PAYMENTS FOR 1912.						£	s.	d.
Wages, etc. Hornsea	..	..	..	..	..	14	0	0
„ Spurn	..	..	..	..	..	14	0	0
Donations, Bampton	..	..	..	..	..	1	0	0
„ <i>re</i> Stone Curlew	..	..	..	..	..	1	0	0
„ Spurn	..	..	..	..	..	1	1	0
Secretaries' expenses and sundries	..	..	..	..	..	0	14	6

						31	15	6
Balance in hand	..	..	..	..	..	24	15	10
						£56	11	4

CONCHOLOGICAL SECTION.

Mr. John F. Musham writes:—Tanfield, Shirley Pool, Mulgrave Woods, Tebay, Bridlington, and Riccall Common were visited and many old acquaintances met with.

Mention should be made of *Neritina fluviatilis* for the East Riding, taken by Mr. J. W. Boulton, of Hull.

A further interesting fact was the extraordinary lateness of the completion of the peristome in many of the *Helices*.

Naturalist,

On the Westmorland border ten species were added to the Tebay list, which were duly recorded in *The Naturalist*, and in South Lincolnshire two species—*Vertigo substriata* Jeffr. and *Hygromia fusca* Mont. have been added to the local fauna by myself.

MARINE BIOLOGY.—The Rev. F. H. Woods, B.D., writes:—The Whitsuntide meeting was, owing to the neap tides, quite unfavourable to shore work, but some shell-sand was examined and found to contain over 50 species. This was afterwards supplemented by some interesting specimens discovered in July. The accounts of both were given in *The Naturalist* for July and October.

The Committee met at the Yorkshire Universities' Marine Laboratory at Robin Hood's Bay on October 12th, 1912. Professor W. Garstang (Chairman), Rev. F. H. Woods (convener), Dr. Irving and Mr. T. W. Saunders were present.

It was resolved that the next annual meeting be held at Filey at the autumnal equinox. Dr. Irving was unanimously nominated Chairman, the Committee to consist of the existing members with the addition of Prof. Garstang.

The Committee made satisfactory investigations of the fauna of the Bay, from Friday to Tuesday (Oct. 11-15) under favourable conditions of tides and weather, and enjoyed the assistance of Miss Cooper (Robin Hood's Bay), Mr. Bellerby, Mr. Fisher, Mr. Hartshorn, and Mr. W. O. Redman King (Leeds University).

ENTOMOLOGICAL SECTION.

LEPIDOPTERA.—Messrs. A. Whitaker and B. Morley write:—During the year many common species have been conspicuous by their absence and scarcely any have appeared in their usual numbers.

In June, five specimens of *A. alni* were taken in the Wakefield district, and in the same locality *M. hastata* was noted in some abundance. In a district where the surrounding conditions have not changed apparently for the last 45 years, writes Dr. Croft, *P. pilosaria* shows a very noticeable increase in the proportion of melanic to type specimens. Mr. T. H. Fisher's discovery of larvae of *T. subtrusa*, feeding on poplar, at Skelmanthorpe, makes a new record for the district. At Skelmanthorpe also a few *X. aurago* have been taken during September and October, by various collectors. Mr. G. T. Porritt has bred from larvae taken at Huddersfield a number of *A. grossulariata* vars. *nigrosparsata* and *nigra*. Mr. Hewett reports the capture of *C. edusa* near York, and Mr. R. Butterfield, two specimens near Keighley. *Vanessa urticae* was abundant in the East Riding during April.

COLEOPTERA COMMITTEE.—Mr. E. G. Bayford, writes: The general consensus of opinion expressed by numerous correspondents is that the exceptionally wet collecting season has resulted in an appreciable scarcity of insects. Many of the places usually visited have been unapproachable owing to floods. Notwithstanding this, when we come to consider the net result of the year's work, we are faced with the most surprising fact that we have one of the largest lists of additions to the County list ever reported. These number 23, two of which have not previously been recorded from the British Isles. Eleven of these new records are due to the energy displayed by Mr. E. C. Horrell, of Scarborough. The most important of them is *Chaetocnema conducta*, a pretty little Halticid of which Mr. Horrell took two specimens by sweeping in Forge Valley. Four are due to Dr. Corbett's industry, three to Dr. Fordham and two to Mr. Thompson; one has been added by myself, while Mr. Stainforth and Mr. Walsh together took a large number of specimens of *Helops pallidus* which, in its way, is one of the most interesting additions to the list. In addition to these species new to the County list, thirty-five others are new to the Riding in which they have been taken. One species has been met with in two of the Ridings for the first time. The full list of the most interesting occurrences will be sent to *The Naturalist*.

HYMENOPTERA, DIPTERA, and HEMIPTERA COMMITTEE.—Mr. W. Denison Roebuck writes:—The only notes on Diptera are records of *Bombylius major* and *Criorrhina floccosa* at Keighley, by Mr. Rosse Butterfield.

The same observer has sent in reports of Hymenoptera for the season, with a list of 14 Ichneumonids and one Sawfly, a few of which are new to the list, as is also *Polyclistus mansuetor* Gr. taken in Leeds by Mr. Walter Withell. Observations on the occurrence of bees, etc., during the season have been made by Mr. Butterfield at Keighley, Mr. John F. Musham at Selby, and Mr. A. E. Bradley and Mr. Roebuck at Leeds. The general result shows that the season has not been a favourable one except in April and May. The outstanding feature of importance in the year's work has been Mr. E. G. Bayford's capture of an ichneumon, identified by Mr. Claude Morley, F.E.S., as *Nemeritis canescens* Grav. The species is most probably parasitic upon *Ephestia kuehniella* L. which is a common moth in the flour mill at Barnsley in which the ichneumon was found. Mr. Morley states that it is a 'South European species extending to Asia Minor, and is not yet known as British.' 'In a wild state these parasites most often attack micros in pine cones and such like pabulum.'

ARACHNIDA COMMITTEE.—Mr. W. Falconer writes:—Lists of the Arachnida met with during the various meetings of the

Yorkshire Naturalists' Union have appeared in *The Naturalist*, viz., Riccall, June, p. 177; Tanfield, August, p. 251, and Tebay, October, pp. 304-5. Only three species have been added to the county list during the year, *Trochosa robusta* Sim. by Mr. J. W. H. Harrison, *Thyreosthenius biovatus* Camb. and *Agyneta subtilis* Camb. by myself, but additional stations have been discovered for some of the lesser known Yorkshire spiders, notably *Porrhomma egeria* Sim., *Gongylidiellum latebricola* Camb., *Typhochrestus digitatus* Camb., *Entelecara thorellii* Westr., *Cornicularia vigilax* Bl., *Cercidia prominens* Westr., and *Oxyptila atomaria* Panz. Spiders have been received for identification or verification from Mr. Winter, and an interesting list of North Riding species from Mr. J. W. H. Harrison. On several occasions in the neighbourhood of Slaithwaite, their dispersal by aerial flight has been again witnessed, the following species taking part, *Edothis fuscus* Bl., *Ed. retusus* Westr., *Erigone dentipalpis* Wid., *E. atra* Bl., *E. promiscua* Camb., *Savignia frontata* Bl., *Dicymbium nigrum* Bl., *Tiso vagans*, Bl., *Microneta rupestris*, C. L. Koch. and *Cnephalocotes elegans* Camb. The harvestman, *Nemastoma chrysomelas* Herm., has once more been met with, and the pseudoscorpions *Chernes nodosus* Schr. at Hull, *C. panzeri* C. L. Koch, at Ingleton and *Chthonius tetrachelatus* at Shipley. Mr. Winter reports the following mites:—*Gamasus coleopterorum* Koch., at Shipley, *Trombidium holosericeum* at Saltaire (F. Booth), *Ottonia clavata*, at Ingleton (F.B.), *Rhyncholophus communis*, and *Ritteria nemorum* in Airedale and Wharfedale (Messrs. R. Butterfield, J. W. H. Johnson and W. P. Winter).

BOTANICAL SECTION.

Mr. J. Fraser Robinson writes:—The excursions at Riccall Common, Bridlington, Flamborough, Cautley, Tebay, and Askern were all productive of excellent results (vide extended notices in *The Naturalist*) and afforded important additions to botanical science. For the East Riding at least, which during the past year had quite adequate attention from the Union, some plant species found are quite new records. *Scirpus sylvaticus*, near Kirkham Abbey, and *Cochlearia anglica* on the muddy northern shores of the Humber near Welwick, are examples. Regrets (and they are great) must here be expressed at the great loss the section has sustained in the deaths of Rev. Canon Fowler, M.A., Phineas Fox Lee, and R. H. Philip, all of whom for long years, and to the last, were most ardent and active botanists.

BOTANICAL SURVEY COMMITTEE.—It is very satisfactory to note the growing tendency of Yorkshire botanists in nearly all branches to pay closer attention to vegetation problems, and

in recording their observations to indicate more clearly than heretofore the conditions of the habitat of the dominant species and to take note of any factor likely to account for the distribution of the species. In Bryology there is a very promising field and we record with pleasure the efforts now being made to regard moss distribution from the ecological standpoint. Plant Associations receive due attention at the Yorkshire Naturalists' Union's excursions, and this is reflected in all the reports published during the year in *The Naturalist*. More detailed accounts than usual have been given, for which reference may be made to *The Naturalist* for the months of March, April, June, July, August, September and October. As an outcome of the excursions special areas are receiving attention, from which interesting results may be expected.

BRYOLOGICAL COMMITTEE.—Mr. Wm. Ingham, B.A., writes:—Mr. C. A. Cheetham initiated the happy plan of organising excursions to various places during the past year. The first was held at Knaresborough, on 27th January, and was very well attended. The chief plants found on this occasion were *Thuidium hystricosum*, *Barbula sinuosa*, *Weisia calcarea* and the liverwort *Haplozia pumila*. It was interesting to see the typical greenhouse liverwort, *Lunularia cruciata*, well established by the river side. A full account of this Excursion will be found in *The Naturalist* for March, 1912.

The next excursion was to Pateley Bridge on 16th March, when the following interesting mosses and hepatics were found:—*Schistostega osmundacea* with its interesting light-emitting lenses on its protonema, *Ditrichum homomallum* in fruit, *Tetraphis browniana*, *Nowellia curvifolia* on earth-covered rocks, *Bazzania trilobata*, *Lepidozia pinnata*, and *Jubula hutchinsiae*. A prominent moss on rocks in the river was the very distinct variety *rivulare* of *Eurhynchium myosuroides*, which to the present has a scanty distribution in the British Isles. Many members were present and the outing was very successful. An account of the excursion will be found in in the April *Naturalist*.

The bryologists joined the excursion of the Union to Skipwith Common on 4th May, a report of which appears in *The Naturalist* for June, 1912. The chief bryological feature was the presence in considerable quantity of *Campylopus atrovirens* var. *muticus*, which has hitherto been considered as quite a montane moss.

At the Tanfield excursion on 15th June (see *Naturalist*, August, 1912), Mr. Barnes found the rare *Thuidium hystricosum* new to North West Yorkshire, also the very rare Hepatic *Pedinophyllum interruptum*.

It is worthy of mention that in *The Naturalist* for July, 1912, is an account of a pre-glacial moss similar in habit and structure

to a moss of the same name now growing on Strensall and Skipwith Commons and in other places in Great Britain. It was interesting to see under the microscope the distinct cell structure of the leaves just as we see it in the Yorkshire moss of to-day.

MYCOLOGICAL COMMITTEE.—Mr. C. Crossland writes:—The fifth series of additions to the known Yorkshire list, since 1905, consisting of 63 species, was published in the March issue of *The Naturalist*.

During the year Mr. Roe has forwarded many uncommon fungi from the Scarborough district, including *Belonidium punctum*, new to Britain, and several others new to Yorkshire, or with only one previous County record. Besides taking interest in fungi as a whole he is paying special attention to the Uredines, and plant diseases generally, with good results.

Early in the year our President and Mr. Roebuck forwarded a parcel of mouldy journals which had been in a damp cellar, to examine. Of four species of Hyphomycetes—moulds—one proved to be new to Britain, and another with only one previous British record. Descriptions of the two will be sent to *The Naturalist* in due course.

Fungi have been collected at all the Excursions. Specimens have been sent from Selby by W. N. Cheesman; from Huddersfield by A. Clarke; Bradford by M. Malone; Hawkswick by H. Wager; Scarborough by A. E. Peck; and Cullingworth and Wilsden by Thos. Hebden, including *Agaricus Bernardii* Quel, new to Britain. All have been duly recorded in my rapidly expanding copy of the Yorkshire Fungus Flora. It is impossible to mention a tithe of new Yorkshire species in this report. They will be found in the forthcoming sixth batch of Yorkshire additions since 1905.

The Committee have held two successful five-day meetings at Sandsend, May 18th-23rd, and September 28th-October 3rd. At the Spring meeting 170 species were met with, 50 of which are additions to the Flora of that district, 16 to Yorkshire, and two to Britain. At the Autumn meeting nearly 400 were noted, 57 being further additions to the locality, 18 to Yorkshire, and eight to Britain, so that for the year the Committee have added 107 species to the previous 1,100 recorded up to the end of the year 1911 for that area. Description of the species new to this country will appear in our monthly journal.

We are convinced that we cannot do better than continue, by the kind permission of Lord Normanby, the observations a year or two longer, as each year so far valuable results have been arrived at.

A coloured plate of four of the species new to Britain, found at Mulgrave, and the one found at Cullingworth, drawn by Miss Ivy Masee, Kew, appears in this part of *The Naturalist*.

GEOLOGICAL SECTION.

Mr. John Holmes writes :—During Whit-week the coast sections between Thornwick Bay and Bridlington were examined. At Askern fossils were collected from the marine bands in the Coal Measures; the material in which they were found having been brought to the surface during the sinking of a pit shaft. Sections were also examined in the Triassic (Bunter), and the Permian Limestones.

On the excursion to Low Gill an attempt was made to trace the relationship between the red conglomerate of Westmorland and the green conglomerate which often occurs at the base of the Carboniferous rocks in North West Yorkshire. It was believed that confirmatory evidence of the existence of an unconformity between the two conglomerates might be found in the many sections cut by the River Lune and its tributaries between Tebay and Ravenstonedale.

The exposures on the left bank of the river were examined but the top of the red beds was nowhere seen. The excursion closed with a visit to the granite quarries at Shap.

COAST EROSION COMMITTEE.—Mr. J. J. Burton, writes :—During the past year the waste of cliff between Robin Hood's Bay and Saltburn-by-the-Sea, has been enormous. The exceptionally dry summer of 1911 caused the land surface on the edge of the cliffs to shrink and crack, thus making it an easy prey during the winter and the recent very wet summer.

All along the coast there has been much slipping, and it is quite safe to say the loss of land has been greater during the past year than for many previous years combined. The same remarks apply to Holderness, the loss of land at Hornsea and Withernsea being exceptionally severe.

JURASSIC FLORA COMMITTEE.—Mr. J. J. Burton writes :—The work done during the past year has been somewhat of a preliminary character in searching for and preparing new places inland for investigation. But much work of actual systematic investigation has also been carried out. The British Association gave a grant for the purpose, of which £5 was allotted to your Committee. The quarry at Marske has been further worked by Dr. Robt. Kidson, F.R.S., Mr. Hamshaw Thomas, Mr. Bowman, Mr. Lane, myself and others.

A new bed has been exposed on Roseberry Topping and has been found exceptionally rich in species. These are at present being worked out at Cambridge.

Some work has also been done in the corresponding beds at Carlton-in-Cleveland. The terribly wet weather of the past summer has been much against all out-door work, and no combined meetings of the members of the Committee have been held in the field, but so much work of locating the beds has been

done that it is intended to hold special field meetings of the Jurassic flora Committee during the coming session.

GLACIAL COMMITTEE.—Mr. J. W. Stather writes:—Within the last few months I have received a collection of boulders and pebbles from the Dogger Bank, dredged by Hull trawlers, about 150 miles east of Coquet Island, off the Northumberland coast.

The large boulders consist for the most part of crystalline rocks, schists, gneiss, quartzites, quartz-porphyrries, etc., while among the pebbles are two or three varieties of fine-grained granites, porphyrites, basalts, and black flints.

As to the original source of these rocks we are unable to say anything with certainty at present, as few (if any) of them belong to types with which we are familiar in East Yorkshire; but we hope to be able to locate at least some of them in the near future.

Mr. Thos. Sheppard writes:—Running parallel with the north shore of the Humber estuary a little to the east of the mouth of the River Hull, and at some distance from the shore, is a long submerged bank which considerably interferes with shipping, known as the 'Hebbles'.

A little while ago it was decided that this should be removed, and powerful dredgers were used. The material excavated has been transferred to another part of the estuary, and from an examination of this, it is apparent that the bank instead of being an ordinary sand or mud bank, as was suspected, turned out to be of solid boulder clay. The boulders consisted of Carboniferous Limestone, Liassic and Oolitic fragments and fossils, Chalk, Basalts, Red Ganites, etc., many of which are well striated. From the boulders and the clay it is apparent that the Bank consists of the Middle Boulder Clay. Through the kindness of Mr. A. E. Butterfield, of the Humber Conservancy, we have been able to acquire a good selection of the boulders.

OTHER COMMITTEES, ETC.

MICRO-ZOOLOGY AND MICRO-BOTANY COMMITTEE.—Mr. J. W. H. Johnson, B.Sc., writes:—This section regrets to record the death of Mr. R. H. Philip, of Hull, one of its oldest and most active workers; and there is now greater need than ever of additional assistance in this branch.

The localities and conditions prevailing during the Yorkshire Naturalists' Union Excursions have not favoured any large addition to the previous records; but the ecological factors concerned in the distribution of several species have been investigated.

SOPPITT MEMORIAL LIBRARY.

For some time the large collection of Fungi made by the late Mr. Soppitt, has been undergoing revision by Mr. S. L. Mosley, Curator of the Huddersfield Museum, who undertook to mount the specimens under glass in a manner convenient for examination. This work, involving a large amount of labour, is now completed, and the specimens thus remounted are deposited in the Soppitt Library. The thanks of Yorkshire Mycologists are due to Mr. Mosley for the work he has so completely carried out.

Mr. Chas. Crossland has presented to the library a copy of his 'Contributions to Halifax Bibliography and Authors', Parts III and IV (Natural History), October, 1911 and March, 1912, reprinted from the Transactions of the Halifax Antiquarian Society.

BRITISH ASSOCIATION.

Mr. Sheppard writes:—I attended the conference of delegates at the meeting of the British Association held at Dundee. In his address the president, Prof. F. O. Bower, dealt with the work of the late Sir Joseph Hooker. It was reported that the circular sent round to the corresponding societies by the British Mycological Society, asking for information respecting the distribution of certain species of fungi, etc., had received no response. Mr. Harold Wager referred to the pioneer work of the Yorkshire Mycological Committee, and exhibited a list of several hundred memoirs and notes bearing upon the mycology of the county, which had been prepared by the secretary, Mr. C. Crossland. Practically all of these were the result of the work of the Yorkshire Committee. Other matters of general interest were discussed.

THE NATURALIST.—The Editors are to be congratulated on the maintenance of the high standard of efficiency of the Union's Journal.

THE PRESIDENCY FOR 1913 has been offered to and accepted by Mr. Harold Wager, F.R.S., of Leeds.

The Union wishes to record its indebtedness to its retiring President, Mr. John W. Taylor, of Leeds, for his services and for the great interest he has taken in all the meetings of the Union during the year.

T.W.W.
W.E.L.W.

FINANCIAL STATEMENT.—The following is the Hon. Treasurer's (Mr. H. Culpin) statement of Receipts and Payments:—

(*See page 72*).

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NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

T. SHEPPARD, F.G.S., F.R.G.S., F.S.A.Scot.,

THE MUSEUMS, HULL;

AND

T. W. WOODHEAD, Ph.D., F.L.S.,

TECHNICAL COLLEGE, HUDDERSFIELD.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

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RILEY FORTUNE, F.Z.S.

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YORKSHIRE NATURALISTS' UNION.

VERTEBRATE SECTION.

President - - - H. B. BOOTH, Esq., M.B.O.U., F.Z.S.

Two Meetings will be held in Room C7 at the Leeds Institute, Leeds, at 3.15 p.m. and 6.30 p.m. respectively, on Saturday, February 15th, 1913.

BUSINESS:—

To appoint Bird Watchers for 1913, and discussion upon other matters in connection with the Yorkshire Wild Birds' and Eggs' Protection Acts Committee.

Papers (mostly illustrated by lantern slides or specimens) will be given as follows:—

"The Fishes of the Lower Wharfe Basin," Mr. G. WADDINGTON.

"Further Notes from Spain," Dr. E. S. STEWARD, F.R.C.S., M.B.O.U.

"Birds of the Sea-shore," Mr. W. WILSON.

"British Reptiles and Batrachians," Mr. W. J. CLARKE, F.Z.S.

Any Member or Associate of the Y.N.U. is invited to attend and to bring notes, specimens, lantern slides, etc., and is requested to bring forward matters of interest connected with the work of the Section and to take part in any discussion.

Will officials of Affiliated Societies kindly notify their Members?

Any further particulars from—

A. HAIGH LUMBY, (*Hon. Sec.*),
Nab Drive, Shipley.

Notes on

The Natural History of Hornsea Mere.

BY

GEORGE BOLAM.

*(Being the Report of the Yorkshire Naturalists' Union Wild Birds
and Eggs Protection Committee's work in this area, with
short notes on Spurn, Bempton, etc.)*

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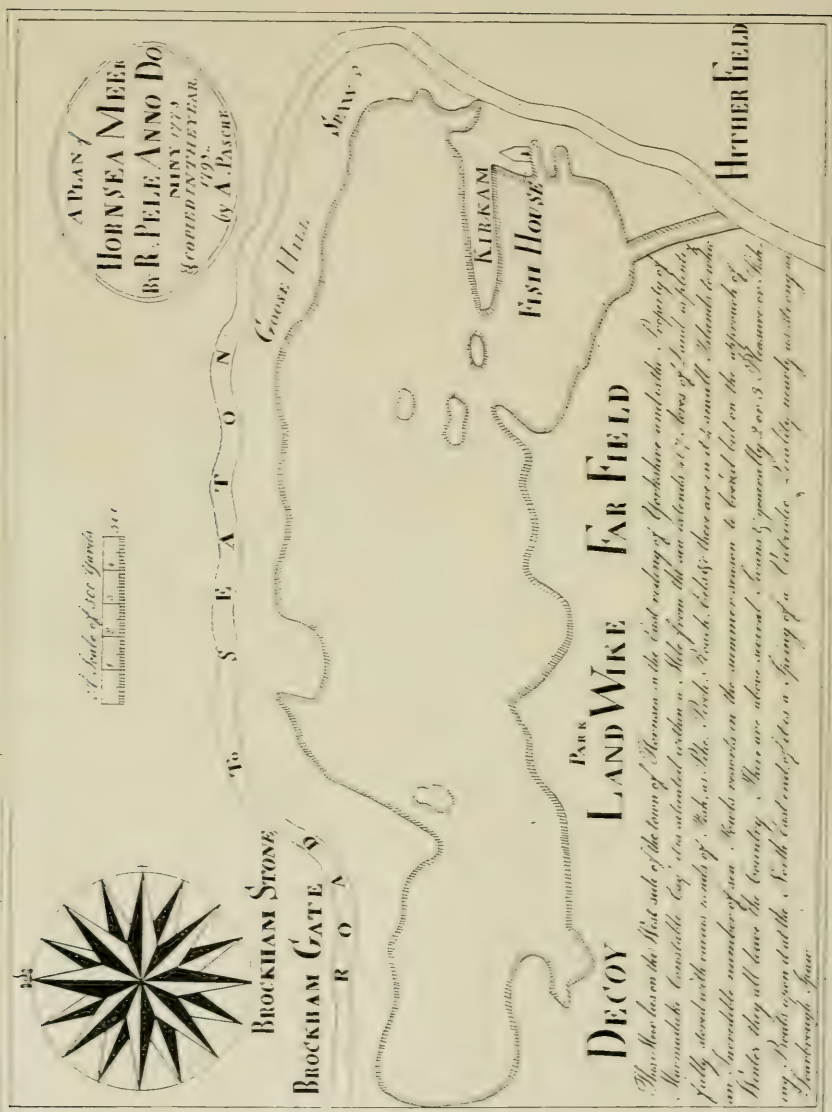
'THE NATURALIST' for 1912.

Edited by T. SHEPPARD, F.G.S. and T. W. WOODHEAD, Ph.D., F.L.S.

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Plan of Hornsea Meer, dated 1778.

NOTES AND COMMENTS.

AN OLD PLAN OF HORNSEA MERE.

In view of the report on the natural history of Hornsea Mere which appears on pages 33-71, it is of interest to reproduce herewith a plan of 'Hornsea Meer' by R. Pele, dated 'Anno Domini 1778,' which we recently saw in the possession of Mr. Ringrose, of Hull, and of which Mr. Ringrose kindly allowed us to take a copy (Plate IV.). It will be seen that in those days there was a 'Kirkham' and 'Fish House,' while around the Mere were Hither Field, Far Field, and Land Wike. In the north-west corner was Brockham Stone and Brockham Gate: on the north shore is the suggestive name 'Goose Hill,' while there was apparently a 'Spaw'—at that time so fashionable—in the north-east corner. The most interesting item, however, is the 'Decoy,' situated at the south-east extremity of the Mere. So that Hornsea, in common with Meaux and Scarborough, once possessed its duck decoy.

A SPRING OF 'VICTRIOLIC QUALITY.'

The following quaint description of the plan appears on the manuscript:—'This Meer lies on the West side of the town of Hornsea, in the East riding of Yorkshire, and is the Property of Marmaduke Constable, Esqr. It is situated within a Mile from the sea, extends 467 Acres of Land, is plentifully stored with various kinds of Fish, as Pike, Perch, Roach, Eels, &c. There are in it 4 small Islands, to which an Incredible number of sea Fowls resorts in the summer season to breed, but on the approach of Winter they all leave the Country. There are above several Swans, & generally 2 or 3 Pleasure or Fishing Boats upon it. At the North-East end of it is a Spring of a Victriolic Quality nearly as strong as Scarbrough Spaw.'

'XXX.'

'XXX' usually indicates something good, and under that number the British Ornithologists' Club has recently issued a massive Bulletin containing the 'Report on the Immigrations of Summer Residents in the Spring of 1911: also notes on the Migratory movements and Records received from Lighthouses and Lightvessels during the autumn of 1910. By the Committee appointed by the Ornithologists' Club. Edited by W. R. Ogilvie Grant.' The title is fairly comprehensive, but hardly conveys an adequate idea of the mine of information the Volume contains in reference to the movements of over 30 of the more important species; details of which are elucidated by no fewer than 20 maps. The Report contains the digested and summarised reports from nearly four hundred correspondents. Certainly ornithological science owes a great debt to Mr. Ogilvie Grant for his herculean efforts as editor.

PERMIANS OF DURHAM.

Part 5 of Volume IV. of the *Proceedings of the University of Durham* is entirely occupied by a substantial and valuable memoir dealing with the Stratigraphy and Tectonics of the Permians of Durham (Northern area). Illustrated by diagrams and photographs, Dr. Woolacott's paper well summarises all previous papers on this difficult series of rocks, and in addition contains particulars of much of the author's own field work. After dealing with the 'foundation' (the Coal Measures floor) he refers to the lithological divisions, marl slate, Upper, Middle and Lower Limestones, palæontology, thrusting, breccias, cellular structures, etc. Altogether it is a very creditable piece of work.

STRUCTURE OF MESOXYLON.

By the aid of many magnificent photographic reproductions of microscopic sections of coal-balls, from Shore, Lancashire, Dr. D. H. Scott gives a valuable contribution to palæobotany in *The Annals of Botany*, Vol. XXVI., No. CIV. His paper is on 'The Structure of *Mesoxylon Lomaxii* and *M. poroxylodes*,' and he concludes that the genus comes very near *Cordaite*, as shewn by the characters of the pith and wood, and further indicated by those of the associated leaves. The affinity with *Poroxylon* is somewhat more remote, and the genus is best placed in the family *Cordaiteae*; it is at present definitely distinguished from *Cordaite* only by the presence of centripetal wood in the stile of the stem. *Mesoxylon* thus forms the last link in the chain of fossil types connecting the *Pteridosperms* with the typical *Cordaite* of the Upper Palaeozoic.

MASS OF ANHYDRITE AT HARTLEPOOL.

At a recent meeting of the London Geological Society, Mr. C. T. Trechmann read a paper on "a Mass of Anhydrite in the Magnesian Limestone at Hartlepool." Apparently the harbour at Hartlepool owes its existence to the erosion of a mass of anhydrite of great thickness, proved by borings and other evidence to exist in close proximity to the Upper Magnesian Limestone upon which the towns of Hartlepool and West Hartlepool are built. The anhydrite is included in, and represents the time-equivalent of part of the Middle and the greater part of the Upper Limestones. The contrary view, that the anhydrite belongs to the overlying red beds here faulted down, is said to be erroneous. Very large quantities of anhydrite were originally deposited with the Magnesian Limestone, the subsequent hydration and removal of which is chiefly responsible for the collapse, degradation, brecciation, and other alterations that are such obvious features of the formation in its present condition.

MAGNESIAN LIMESTONE FOSSILS.

The distribution of organisms in the Magnesian Limestone was largely influenced by the quantity of sulphates present in the surrounding water. The Shell Limestone is a chain of reef-knolls, in the building up of which limited numbers of forms take part, probably induced by current action in the Permian Sea and lying more or less parallel with the old Permian shore-line. The increasingly unfavourable conditions prevailing towards the top of the Shell Limestone bring about a dwarfing and gradual extinction of the typical Shell-Limestone fauna. The distribution and present condition of the Upper Magnesian Limestones in Durham is curious. The Permian succession is more complete in the southern than in the northern area of the county. Various sections in the Upper and Middle Limestones in the Hartlepool area were described, among them the recent sinking for Blackhall Colliery, where the entire series was pierced, including the full thickness of the Shell Limestone.

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Mr. Gerrard's report on the output of minerals for the Manchester district during 1911 appears in *The Quarry* for January 1913.

In *The Entomologist's Record*, Vol. XXIV., No. 12, the Rev. G. H. Raynor describes a collection formed in Essex sixty-six years ago, which contains a few interesting northern records.

The Entomologist for January announces the death of Thomas Boyd, the entomologist, which took place in February, 1912. Other more recently deceased entomologists are Peter Cameron, George C. E. Brabant, and Arnold Wulschlegel.

In *Knowledge* for January is a lengthy and scathing article on the alleged perfect arrangement and classification of the specimens in the new London Museum at Kensington Palace, by 'A Provincial Curator.' His views coincide with those expressed in our columns some little time ago.

Mr. D. Sharp, F.R.S., describes a new beetle, *Bladius gulielmi*, from Linthorpe, Middlesbrough, in *The Entomologist's Monthly Magazine* for January. No figure of the species is given. In the same journal Mr. Porritt confirms the record of *Platycleis roeselii* for Trusthorpe, Lincs., first made by Mr. Wallis Kow.

Mr. J. K. Stanford records in *British Birds* that he recently was 'observing migration' on the Holderness coast, and 'obtained' the following birds, 'noteworthy owing to their rare occurrence':—Fire-crested wren, shot; red-breasted flycatcher, shot; Blyth's reed-warbler (it 'was very tame, and was "obtained"'), barred-warblers (a male 'obtained' and a female shot).

Messrs. Hutchinson & Co.'s *Customs of the World*, which is being issued in fortnightly parts, keeps well up to the standard of the first number in the wealth of illustration, and in the quaintness of the ceremonies and people portrayed. Some of the ground drawings and 'sacred drawings' illustrated therein are not so very much unlike the cup-and-ring markings occasionally found carved on the rocks in the north of England, as at Ilkley.

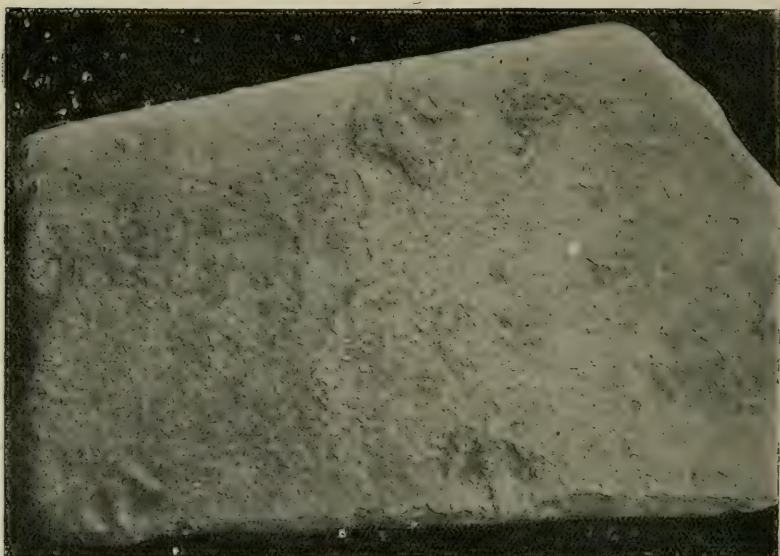
FOSSIL FOOTPRINTS NEAR SCARBOROUGH.

J. A. HARGREAVES.

IN December last, Mr. Arnold Wallis and Mr. Stevenson observed several footprints in fallen blocks of rock at the foot of a cliff about $3\frac{1}{2}$ miles north of Scarborough. Further visits were paid to the place and eventually the specimens were removed to the Scarborough Museum.

Fossil footprints, though well known from Triassic and Wealden strata, both in this country and elsewhere, have not long been known from Oolitic rocks.

About 18 years ago Mr. Rowntree obtained a footprint from



Fossil Footprints near Scarborough.

Cayton Bay, which Mr. Lamplugh pronounced to be probably crocodilian.

In 1907 and again in 1908, Mr. Harold Brodrick, of Birkdale, found a number of footprints in Lower Oolitic fallen blocks at Saltwick, near Whitby. The specimens were removed to the Whitby Museum and are described and figured in *The Naturalist* for August, 1908, pp. 301-302.

The footprints recently found are in blocks of unevenly bedded sandstone, which had evidently fallen from a rather high cliff. They are somewhat weathered. The district where they occurred is difficult of access, and is rarely visited except by shore fishermen and gravel gatherers.

The cliff, which is capped by about 50 ft. of boulder clay, is in the Upper Estuarine Series.

The blocks apparently belong to beds just above high water mark, which are irregular, shales and sandstones alternating, the sandstones in several cases being lenticular, some of them being strongly false bedded, although at least two of the beds are more persistent and practically horizontal. The fallen slabs are not identical in appearance, so that it is probable the footprints persist vertically through the strata for at least some distance. Unfortunately, the beds being at the foot of the cliff, it would be difficult to lay bare the rock in situ, thus



Fossil Footprints near Scarborough.

exposing the old Oolitic floor, though efforts will be made to find the footprints in the cliff itself.

At present it is difficult to state whether the stratum is lacustrine, estuarine, or marine, as with the exception of small fragments of wood, no fossils have been detected.

About a dozen blocks have been found. Although most of the footprints may be roughly grouped in two sizes, one group being $5\frac{1}{2}$ or 6 in. long, and the other 3 or $3\frac{1}{2}$ inches, they do not seem to be the fore and hind feet of dinosaurs, which in many cases differ largely in size. Their position on the blocks shows that this is not the case, hence they would appear to have been made by animals of different sizes, as shown by the various sizes and shapes of the footprints.

The sand of which the rock is composed is coarse, so that only the rough outlines occur, and in some cases the toes appear jointed. Some of the fossils are casts in relief, and some are imprints.

With two exceptions, all the footprints, when distinct, are three toed, in some cases long and slender, in others broad, each toe being markedly conical. Presumably they have been made by dinosaurs.

Some of the prints show that a claw occurred at the end of each toe, and the feet are 'in-toed.'

The *Cetiosaurus*, of which species there are bones in the Scarborough Museum, is the only dinosaur recorded from these rocks by Fox-Strangways, but its foot was too large for such impressions. *Megalosaurus* is also recorded from Corallian rocks at Malton, but this animal is hardly likely to have made the footprints.

The prints vary much in thickness, probably partly due to pauses in walking, and partly to varying plasticity in the floor. Many footprints are imperfect, and others are confused by two or more impressions intermingling.

There are many shallow grooves on the stones, some extending over a foot in length, which may have been made by the tail. If this is so it must have been attenuated, as the grooves are only half an inch wide, though in one case the groove widens to an inch and a half.

Smaller but equally long and distinct impressions occur several times, in various directions. These consist of two narrow grooves $\frac{1}{8}$ inch apart. The right hand groove is the more pronounced and persistent. Such an impression might have been produced by small spines or tubercles on the under side of the tail.

At least two of the blocks apparently contain the casts of raindrops.

The longest stride measured is 22 inches. In one block are four footprints in a line. The stride is about $9\frac{1}{2}$ inches, and the prints vary from 90×95 mm. to 75×75 mm. There is a fifth and larger footprint at right angles.

The photograph (page 92) shows three footprints 92×80 ; 80×75 ; 70×70 mm., of which two belong to the same animal and give a stride of $10\frac{1}{2}$ inches. A large block contains at least 9 impressions. These indicate strides of 22 inches, $8\frac{1}{2}$ and $11\frac{1}{2}$ inches. Five of the prints are of the larger and four of the smaller type. On another block is a print, the only one of its kind. This contains four toes and measures 83×68 mm.

The most interesting block of all contains the largest footprint, which measures 150×160 mm. Near it are two footprints evidently belonging to a different animal, and a third of quite a distinct type.

Two of these, like all on this block, are imprints, are long and narrow, and not at all 'splayed.' They do not cover half the area of the other large footprints, the toes being almost parallel with each other. They also show signs of joints. They do not seem to have any connection with any other imprints. Near them is a footprint showing the 'pad' and the tips of five toes. This is markedly distinct from all other impressions and almost suggests a crocodilian imprint, in which connection it may be mentioned that a vertebra of *Telcosaurus* is recorded from Castle Hill. What appears to be an imperfect second similar print appears on the same block.

Altogether not fewer than thirty prints have been counted, rejecting all doubtful specimens. For the photographs I am indebted to Mr. A. E. Peck, F.L.S., and Mr. A. I. Burnley.

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THE BEARBERRY ON THE SOUTHERN PENNINES.

A. BRUCE JACKSON.

WHEN driving in the Peak District last summer with my friend, Mr. T. E. Routh, I took the opportunity of looking up the Bearberry (*Arctostaphylos Uva-ursi*) in the two South Pennine localities recorded by Dr. Moss in *The Naturalist*, 1908, p. 288, and was glad to find it still plentiful in both the South-west Yorkshire and North Derbyshire stations. A keeper who showed me the plant on the hillside knew of its occurrence on more than one clough on the Derwent Moors. He called it 'Uvers' under which name it is known to local herbalists who come in numbers from Sheffield and Manchester to gather it for medicinal purposes. An infusion of the leaves is said to be good for kidney complaints.* No doubt the Cowberry (*Vaccinium Vitis-idaea*) is gathered as well as the Bearberry as both plants grew in close association, but the wholesale collection of both species, which I am informed takes place, must soon lead to extinction so far as the rarer plant is concerned. No fruits of the Bearberry were seen, although a careful search was made for them.

I have looked repeatedly for *Arctostaphylos* on the moors near Fox House but have so far been unable to verify the records of its occurrence there by the earlier botanists. One of Whitehead's original localities, 'Stenior Clough, near the source of the Derwent,' is quite close to the spot where I saw it on the Yorkshire Moors. This species attains its southernmost limit in Derbyshire.

* Bentley and Tremen (*Medicinal Plants*, Vol. III., 163, 1886), state that the leaves have astringent properties, and are reputed to have a specific effect in certain diseases of the kidneys and bladder.

THE NUPTIAL HABITS OF THE BLACKCOCK.

EDMUND SELOUS.

IN an article contained in the 10th section of *The British Bird Book*, lately issued, which deals with the 'Grouse Sub-family,' there is no reference to certain facts concerning the nuptial habits of the Blackcock, which I have put upon record, although these facts quite contradict what is generally stated on the subject, which *The British Bird Book* now repeats. This silence, from whatever cause proceeding, is not in the interests of truth, and moreover does great wrong to Darwin, whose brilliant and most original theory of sexual selection my observations most strongly confirm. I should like, therefore, to point out that in 1907, in Sweden, and in 1908, in England, I watched these birds at their courting-place, from April 12th to May 6th, and from May 6th to 16th, respectively, very closely and carefully, and noted down, *in situ*, everything that took place. The principal facts which my notes bring out are the following:—

(1) In every case, with one single exception, the cock birds courted the hens by a slow, formal, pompous display, in which every special point of the plumage was carefully and elaborately shown; a display of which I have never seen any account, and which is absolutely different from the supposed one of 'dancing'—supposed, I mean, in this connection. By this display, alone, the hen, which was obviously conscious of its nature and purpose, was won, if at all. She was hard to win, and frequently left the ground heart-whole, but whenever she did yield, or came near to yielding, it was always in response to the courtship, and she then showed unmistakable evidence of predilection, and what may well be called fascination. The approach of another hen provoked jealous rage on the part of her rival, leading either to fierce combats between them, or the chasing away of one by the other. In the single exception referred to, a male did not court, but perseveringly endeavoured to gain his end by force, in which he was uniformly unsuccessful.

(2) The so-called dancing, or leaping into the air, of the cocks, though the general excitement arising from the flying in to the courting ground of any hen, would often set it off, was never specially addressed to the hen, nor did she show any interest in it. It was distinct from the courtship, and played no part in it whatever. Observation went to show that the dancing has been developed along different lines, being probably, in its origin, a challenge to rival males. The fact of these species practising two kinds of antics, or set movements, during the nuptial season, distinct from each other, and not used for the same purpose, is very interesting, and, from the point of view



FIG. 1.—Concrete 'Trunk Head,' Stream Dyke. Nov. 12th, 1912.



Photos by]

[H. S. Harker.

FIG. 2.—Sea-ward end of Stream Dyke looking east. Nov. 12th, 1912.



FIG. 3 —Stream Dyke, looking up stream. Nov. 16th, 1912.



Photos by]

[H. S. Harker.

FIG. 4.—Water from Stream Dyke, looking east. Nov. 16th, 1912.

of sexual selection, most significant. This dancing however, was uniformly so poor, compared with an example of it which I once saw in Norway, that its maximum development would appear to be only exceptional.

(3) The actual fighting of the cocks was very little, compared with what may be called the make-believe of it, and, as is the case with the Ruff, showed evidence of deterioration, owing to the far greater—the paramount importance of the formal courtship, which alone influences the hen. The only way in which superior martial prowess might possibly have availed with her, was through the driving away by one suitor, of rival suitors, but as the hen kept passing on over the arena, thus coming into the standing-places, upon it, of other males (for, as with the Ruff, each had his special one) by whom she was, in turn courted, while the mere act of pursuing any bird took the pursuer away from her, I do not think it can count for much, nor is it of the smallest use unless the courtship is pleasing. I saw a striking instance of this, in which the hen, having been twice thus prevented from giving effect to her choice, flew away as a consequence. For the fighting of the cocks, as such, the hens cared nothing. Suitors could only recommend themselves through the prescribed form of courtship.

(4) There was no attempt, on the part of the cock birds, to collect harems. The hens came in sparingly, and, having made their choice, flew away and were not followed—nor did they stay long if they found no bird to their liking. In England, more particularly, where the assembly was a larger one, the cocks always greatly outnumbered the hens.

(5) All the notes of the male birds seemed to have reference to each other rather than to the hens. The courtship was gone through in silence, unless some note was uttered which was too low for me to hear.

Of all this there is no mention in the article alluded to. Nothing is said about the anything but 'indifferent' conduct of the hen, showing so clearly her power of choice—rigorously exercised—and consequent paramount position—all as inferred by Darwin, but still so constantly denied. Again we are told of the cocks dancing to the hens—a mere frantic motion which does not specially set off any of the special points of the plumage. No hint is given as to the totally different kind of display, in which all are carefully emphasised, by which the hen to be won, must be courted; and yet, strange to say, this display has been actually described, but unconsciously, in the letterpress devoted to the Pheasant—for the courting of both these birds is essentially (though not, of course, exactly) the same. How has all this error arisen? Very simply, as I imagine. Various authorities, having seen male Blackcocks jumping about in the morning, have assumed that this was their nuptial display

before the hen; and other misconceptions have followed this fundamental one.

With regard to the accuracy of my previous notes: "An Observational Diary on the Nuptial Habits of the Blackcock in Scandinavia and England," which was published in *The Zoologist* for 1909, I have never had better opportunities for observation, especially in England, which yielded the best results. Everything I saw I noted, and also everything I did not see which has been stated or implied for a good many years. In England, at any rate (and my observations here corroborate those made in Sweden) I saw everything in full swing, and from the earliest moment,* always being on the spot before dawn, which sometimes necessitated starting at midnight. I did everything, within my power, to further scientific truth, and have indeed produced immensely strong evidence in favour of the Darwinian theory of sexual selection. It would seem, however, that, since the theory itself is (officially) out of favour, such evidence is not wanted. 'Burial' it brings; here's a state of things!

My enquiries also indirectly give support to a statement made by Mr. Abel Chapman in regard to the snow-burrowing habits of the Red Grouse. This, apparently in the opinion of the writer of the article in question, stands in much need of it, in which 'parlous state' it is left by him. The Swedish forester, however, who sometimes acted as my guide, told me that, in winter, the Blackcock habitually burrowed in the snow, and he further averred, speaking as assuredly of the one as of the other, that they often had to support themselves by eating their own excrements—that this was, in fact, their habitual practice. In regard to the first point the statement of such a man must surely carry conviction, nor should it, in my opinion, be lightly dismissed in regard to the other either.†

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The Nineteenth Report of the **Leicester Museum and Art Gallery**, refers to the period from April 1st, 1910, to March 31st, 1912. Much progress seems to have been made in the geological and botanical departments. At present the archaeological collections are stored. 'A commencement has been made also in the matter of lectures to school teachers.'

* This applies, for the most part, to Sweden also. What I mean by the qualification here is that, as I left on May 6th, things may have 'come on' more afterwards. It seemed, however, to be going the other way. This, I believe, was owing to the birds being disturbed, and becoming unsettled, through shooting—here, as ever, the gun and observation are antagonistic. In England I saw, as I believe, both the rise and the zenith, as well as the decline, but there was no discrepancy as between the two countries.

† The habits of the Termites, or White Ants, should be remembered in this connection.

COAST CHANGES AT HORNSEA.

T. SHEPPARD, F.G.S.

(PLATES V. AND VI.).

IN *The Naturalist* for April 1912, pp. 114-120, we gave a series of photographs illustrating the coast changes at Hornsea, one of which showed the sea-ward end of the Mere Stream, or 'Stream Dyke.' These had been taken just before the journal appeared.

Since then, the storms of November last have played havoc with the coast-line in the Hornsea neighbourhood, and even the photographs taken within a few months of each other show remarkable differences.

After a storm and unusually high tide early in November, great quantities of sand were carried over the low cliffs and into the field beyond, just south of the remains of the Pier. The fields were also flooded, but most of the water drained off as the tide fell. The mouth of the Stream Dyke was entirely blocked with many tons of sand and gravel, and the outfall shown in the photograph in *The Naturalist* for April last, was entirely buried. The recent rains had caused the waters on Hornsea Mere to be unusually high, and the Stream Dyke was running at a rate rarely known. These waters cut through the accumulation of sand, and formed an exit to the north of the proper 'clew.' The stream is at present so powerful that it entirely cuts off the walk along the sands to the south of the town.

Fig. 1 (Plate V.) shows the concrete 'Trunk Head' of the Stream, entirely covered by the sand. Fig. 2 (Plate V.) shows the new channel cut by the dyke, and its course over the sands to the sea. Its former outlet, with the iron cage, is shown to the right of the picture. Fig. 3 (Plate VI.) is from a photograph taken looking towards Hornsea Mere; the stream, instead of flowing straight into the sea, has taken a turn to the right (north) and has cut through its former channel, which can be seen to the right of the photograph. Fig. 4 (Plate VI.) is taken from the same point as Fig. 3, but looking towards the sea. It shows the fresh water finding its way across the sand to the sea, whereas formerly it was an insignificant stream and flowed on the opposite (south) side of the groyne.

The remains of the roadway shewn to the left of South Cliff Cottage, in *The Naturalist* for April 1912 (Plate VIII.), have now entirely gone, and the 'last remnants' of the old sand-bank, shown on Plate X. in the same publication, have also disappeared.

I am indebted to Mr. H. S. Harker for the trouble he has taken in securing the photographs which are used in the illustration of this note.

YORKSHIRE COLEOPTERA IN 1912.

E. G. BAYFORD, F.E.S.

FURTHER to the note in *The Naturalist* for January, page 82, one addition to the county list, made in 1912, deserves special mention, viz., *Helops pallidus* Curtis, found in profusion at Spurn by Messrs. Stainforth and Walsh. The northernmost records given by Fowler are Harwich on the East Coast, and Wallasey, in Cheshire on the West. Since 1891, the date of publication of Fowler's volume dealing with the species, the known range on the west has been extended northward across the Mersey to Formby, midway between Liverpool and Southport, where it has been taken by Prof. Hudson Beare. On the East Coast, Mr. Claude Morley, F.E.S., records one specimen 'on Felixstowe sandhills, dead, and imperfect,' and adds 'I should have some hesitation in including my very poor specimen if I did not know that the species occurs just across the river at Harwich and in other localities along the Essex Coast.'*

The locality in which Messrs. Stainforth and Walsh found the species is the most northern point yet recorded for it, and is about 120 miles as the crow flies from Felixstowe, which is the southern extremity of the County of Suffolk. It will be interesting to note how long it will take to link up these widely distant localities; the coast lines of Lincolnshire, Norfolk and Suffolk, intervening between them, presenting a coast line of about two hundred miles in extent. In this connection it is noteworthy that Mr. Horrell's capture of the allied species *H. striatus* Fourc. at Cloughton is the first and only known record for the North Riding.

In addition to the following, which comprise the more interesting records, are those referred to in Mr. Horrell's notes on pp. 103-104.

The initials are those of Drs. Corbett and Fordham, Messrs. E. C. Horrell, E. W. Morse, T. Stainforth, M. L. Thompson, G. B. Walsh and E. G. Bayford.

* signifies the first record for the riding in which it has been found.

† signifies new to the county list.

‡ signifies new to the British list.

Carabus monilis F. Extraordinarily abundant around Bradford. J.W.C.

* *Notiophilus quadripunctatus* Dej. Eston Nab, near Middlesborough. G. B. W.

* *Dyschirius globosus* Herbst. Bubwith, near Selby. W. J. F.

* The Coleoptera of Suffolk, p. 90.

- Chlaenius vestitus* Payk. Bridlington. T. S.
 „ *nigricornis* F. Bubwith and West Colling-
 worth. W. J. F.
 **Acupalpus dorsalis* F. Skipwith. W. J. F.
 **Bradycellus similis* Dej. Skipwith. W. J. F.
 **Harpalus froelichii* Sturm. Skipwith and Thorganby. W. J. F.
Pterostichus versicolor Sturm. Skipwith. W. J. F.
 **Anchomenus oblongus* F. Bubwith. W. J. F.
 **Bembidium rufescens* Guer. Bubwith. W. J. F.
 „ *lunatum* Duft. Sandholme. T. S.
 **Noterus clavicornis* De G. Shirley Pool, Askern. H. H. C.
Hydroporus umbrosus Gyll. Skipwith. W. J. F.
 **Agabus femoralis* Payk. Skipwith. W. J. F.
 **Dytiscus circumcinctus* Ahr. Bubwith. W. J. F.
Philydrus minutus F. Skipwith. W. J. F.
 †*Helochaeres punctatus* Sharp. Thorne. H. H. C.
 †*Laccobius minutus* L. Skipwith. W. J. F.
 **Thelophorus aeneipennis* Thoms. Skipwith. W. J. F.
 **Hydrochus elongatus* Schall. Thorne. H. H. C.
Gyrophaena gentilis Er. Helmsley. G. B. W.
 * „ *manca* Er. Helmsley. G. B. W.
Gymnusa variegata Kies. Kildale-in-Cleveland. M. L. T.
 **Philonthus cephalotes* Gr. Roundhay. E. W. M.
 † „ *nigrita* Nor. Kildale-in-Cleveland. M. L. T.
 **Cafius fucicola* Curt. Withernsea. G. B. W.
 **Lathrobium terminatum* Gr. Skipwith. W. J. F.
 †*Cryptobium glaberrimum* Herbst. Skipwith. W. J. F.
 **Deliphrium tectum* Payk. Doncaster district. H. H. C.
 **Philorhinum sordidum* Steph. Skipwith. W. J. F.
 **Homalium deplanatum* Gyll. Meanwood. E. W. M.
Pseudopsis sulcata New. Eston-in-Cleveland. M. L. T.
Hydnobius perrisii Fair. Eston-in-Cleveland. M. L. T.
 **Choleva anisotomoides* Spence. Doncaster district. H. H. C.
Rybaxis sanguinea L. Hornsea Mere. T. S.
 **Trichopteryx bovina* Mots. Doncaster district. H. H. C.
 **Subcoccinella 24-punctata* L. Doncaster district. H. H. C.
 †*Anisosticta 19-punctata* L. Doncaster district. H. H. C.
 **Gnathonus nannetensis* Mars. Adel. E. W. M.
Micropeplus margaritae Duv. Adel. E. W. M.
Carpophilus 6-pustulatus F. Sandall Beat. H. H. C.
 † „ *obsoletus* Er. Edlington. W. E. Sharp, F.E.S.
 **Epuraca parvula* Sturm. Sandall Beat. H. H. C.
Ips 4-guttata F. Saltburn. M. L. T.
 **Rhizophagus nitidulus* F. Meanwood. E. W. M.
 **Monotoma longicollis* Gyll. Adel. E. W. M.
Enicmus fungicola Thoms. Meanwood. E. W. M.
Laemophloeus pusillus Sch. Barnsley. E. G. B.
 †*Nausibius dentatus* Marsh. Barnsley. E. G. B.

- †*Silvanus unidentatus* Ol. Sandall Beat. H. H. C.
Cryptophagus distinguendus Sturm. Roundhay Park. E.W.M.
 „ *bicolor* Sturm. Doncaster district. H. H. C.
Litargus bifasciatus F. Sandall Beat. H. H. C.
 **Dermestes undulatus* Brahm. Brighton. W. J. F.
 **Cryptohypnus 4-pustulatus*, F. Brighton. W. J. F.
Athous longicollis Ol. Brighton. W. J. F.
Limonium cylindricus Pk. Bubwith. W. J. F.
Lamproyris noctiluca L. Yarm. W. J. F.
Grammoptera tabacicolor De. G. Helmsley. G. B. W.
Orsodacna cerasi L. and var. *glabratus* F. Helmsley. G. B. W.
 †*Longitarsus suturalis* Mars. Eston-in-Cleveland. M. L. T.
 **Phyllotreta tetrastigma* Com. Bubwith. W. J. F.
 * „ *exclamationis* Thunb. Bubwith. W. J. F.
 †*Chaetocnema conducta* Motsch. Forge Valley. E. C. H.
Phaleria cadaverina F. Spurn. T. S.
 †*Helops pallidus* Curt. Spurn. T. S., and G. B. W.
Grypoidius equiseti F. Bubwith. W. J. F.
 †*Erirhinus bimaculatus* F. Bubwith. W. J. F.
 †*Nanophyes lythri* F. Hatfield. H. H. C.

Since the above report was prepared and presented, Dr. Sharp, F.R.S., has described (*Ent. Mo. Mag.*, xlix. 1., Jan. 1913) under the name '*gulielmi*' a species of *Bledius* new to science, founded on three specimens taken by Mr. W. E. Sharp, F.E.S., in Yorkshire. From a note by the latter gentleman on p. 14, we learn that he took four specimens, and that the precise locality was the banks of a small stream at Linthorpe near Middlesbrough.

To the long list of good things included in the report, we have thus to add for the first time an insect new to science.

Mr. C. J. Gahan has been appointed first keeper of the new department of Entomology at the British Museum.

'In his '*Notes on Hydreionocrinus*,' printed in *The Transactions of the Edinburgh Geological Society* (Vol. X., pt. 1), Dr. F. A. Bather describes and figures specimens from Yorkshire and Derbyshire.

From our contributor, Mr. T. Petch, who is now in Ceylon, we have received three valuable papers, reprinted from the *Annals of the Royal Botanic Gardens, Peradeniya*. There are further notes on the Phalloideae of Ceylon, Revisions of Ceylon Fungi, and the Ustilagineae and Uredineae of Ceylon. The plates accompanying the first paper are remarkably fine.

We have many times had the pleasure of referring to the interesting and well written articles on natural history subjects, appearing in the *Yorkshire Observer*, in its 'Out of Doors' column, and in numerous special articles. And we have always looked to its columns for the most detailed accounts of the meetings and excursions of the various scientific societies in the county; but surely journalistic perfection has been attained in the well illustrated report of the meeting of the vertebrate section of the Yorkshire Naturalists' Union, held at Leeds a little while ago.

Naturalist,

NOTES ON THE BEETLES OF SCARBOROUGH.

E. CHAS. HORRELL.

DURING the past year I have determined the following additions to the Beetle Fauna of the Scarborough District as defined in my note in *The Naturalist* for February, 1912, p. 49. Mr. Bayford has again been so kind as to confirm my names for nearly all the species. With these additional records, and several already published in Canon Fowler's 'British Coleoptera,' and by Mr. Stainforth in the Transactions of the Hull Scientific Club, with which I was not acquainted when compiling my last year's list, the number of species and varieties of Beetles now known for the District as defined in the above note, is the respectable total of 1,057.

A dagger (†) denotes new records to the Yorkshire Fauna. An asterisk (*) occurs before new records for the Riding. It will be observed that of the 54 records, 11 are additions to the Yorkshire List. Unless otherwise noted all the following have been found by myself:—

Bradycellus cognatus Gyll., Cloughton.

Dichirotrichus pubescens † Payk., Raincliffe Woods.

Pterostichus versicolor Sturm., Scarborough.

Calathus mollis Marsh., Cloughton.
Bembidium lampros Herbst. var. *coeruleo-tinctum* Rtt., Cloughton.

B. nigricorne Gyll., Hellwathbeck.

**B. riparium* Ol., Forge Valley.

Patrobis assimilis Chaud., Silpho Moor.

Haliplus fulvus F., Raincliffe Mere.
Gyrinus marinus Gyll., Snainton (leg. W. C. Hey).

**Tachyporus solutus* Er., Hackness and Raincliffe Woods.

Mycetoporus splendidus Grav., Seamer Carrs.

Tachinus laticollis Grav., Raincliffe Woods.

•*Ocyus ater* Grav., Scarborough.

Othius myrmecophilus Kies., Hackness.

Lathrobium fulvipenne Grav., Raincliffe Woods and Silpho Moor.

†*Medon pocofer* Peyr., Cloughton.

Stenus bipunctatus Er., Langdale End.

S. palustris Er., Raincliffe Woods.

**S. flavipes* Steph., Raincliffe Woods

†*Oxytelus inustus* Grav., Forge Valley.

Oxytelus nitidulus Grav., Raincliffe Woods.

O. sculpturatus Grav., Langdale End.

Eumicrus tarsatus Mull., Ayton (leg. W. C. Hey.).

Scydmaenus collaris Mull., Raincliffe Woods.

**Silpha opaca* L., Scarborough.

Choleva chrysomeloides Panz., The Carrs (leg. W. C. Hey.).

**Micropeplus margaritæ* Duv., Hackness.

†*Atomaria basalis* Er., Raincliffe Woods.

Limnius tuberculatus Mull., Forge Valley.

Parnus auriculatus Panz., Langdale End (leg. W. C. Hey.).

Phyllopertha horticola L., Hackness.

Corymbites pectinicornis L., Lady Edith's Drive (W. Pearson).

Dascillus cervinus L., Ayton (leg. W. C. Hey.).

Toxotus meridianus L., Forge Valley.

†*Zeugophora subspinosa* F., Langdale (about 40 examples).

†*Longitarsus ochroleucus* Marsh., Cloughton.

Aphthona nonstriata Goeze, Raincliffe Woods.

†*Phyllotreta crucifera* Goeze, Hackness and Langdale End.

‡ A curious locality for this salt-marsh species.

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| † <i>Phyllotreta vittula</i> Redt., Hackness.
<i>Psylliodes picina</i> Marsh., Forge Valley.
* <i>Helops striatus</i> Fourc., Cloughton.
* <i>Apion craccæ</i> L., Langdale End.
<i>Apion ononis</i> Kirby, Scarborough.
† <i>A. bohemani</i> Thoms., Raincliffe Woods.
<i>Brachysomus echinatus</i> Bousd., Cloughton.
<i>Polydrusus tereticollis</i> De G., Forge Valley. | <i>Polydrusus micans</i> F., Hackness.
<i>Phyllobius viridiæris</i> Laich., Langdale End.
<i>Silones crinitus</i> Herbst., Raincliffe Woods.
<i>Coeliodes quercus</i> F., Raincliffe Woods.
† <i>Nanophyes lythri</i> F., Hackness.
† <i>Ceuthorrhynchidius dawsoni</i> Bris., Scarborough.
† <i>Phytobius canaliculatus</i> Fahr., Forge Valley. |
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The Making of the Earth, by Prof. J. W. Gregory. London: Williams & Norgate, 250 pp., 1s. net.—In this well-bound and very cheap volume Professor Gregory summarizes the history of our planet from the time it was a nebula. He deals with ancient climates, formation of the earth's crust, earthquakes, upheaval, plan of the earth, geographical elements, the biosphere, first life on the earth, etc.

Rocks and their Origins, by A. J. Cole. Cambridge University Press, 175 pp., 1s.—Under the heads of Limestones, Sandstones, Clays, etc., Igneous Rocks and Metamorphic Rocks, Prof. Cole gives a charming account of the origins of the principal rocks that form the earth's crust. By the aid of several good illustrations his stories are made doubly interesting. The book is one that can be read and appreciated by a beginner.

Dana's Manual of Mineralogy, by W. E. Ford. Thirteenth Edition. London: Chapman & Hall, 1912, pp. vi. + 460, 8s. 6d. net.—'Dana's Manual' is almost a household word in English scientific circles, and no words of ours are needed to draw attention to its excellent contents. Suffice it to say that a new edition—the thirteenth—has been issued, which speaks well for the popularity of the volume. There are nearly 400 good illustrations in the text.

Gem-Stones and their Distinctive Characters, by G. F. Herbert Smith. London: Methuen & Co., pp. xiv. + 312, 6s. net.—Dr. Smith's connection with the Natural History Department of the British Museum peculiarly qualifies him for the task of writing a general treatise on Gem-stones, and he has been particularly successful. He deals with the subject from the practical, geological, and jeweller's point of view, and in a series of forty chapters gives an admirable history of the subject. There are numerous plates, some being coloured. The latter, showing the forms of crystals in their natural colours, are all that can be desired.

The Work of Rain and Rivers, by Prof. T. G. Bonney. Cambridge University Press, 144 pp., 1s. In this little handbook Professor Bonney gives a good summary of the work of rain and rivers in moulding the earth's surface, and deals with (1) Carving and carrying, (2) Making of valleys, (3) Transport and deposit of materials, (4) History of a river system, and (5) Man's learning of Nature's lesson. We notice on his first page that Professor Bonney considers that 'of late years geologists in North America, and the younger school of them in England, have often manifested a tendency to exaggerate the effects produced by glaciers and ice-sheets,' and his remarks (pp. 112-113) in reference to the dry valleys in Cleveland are very definite. He will have none of the younger geologists' views that they are lake overflow channels, but 'they are the dry beds of streams which had already flowed far, not of those near the beginning of their source.' We await with interest Professor Bonney's promised 'demonstration' that the form of these valleys is irreconcilable with any such glacier-lake origin. At present Professor Bonney's attitude seems to be like that of 'our Bill,' who was the only one in step in his regiment!

RAINFALL RECORDS AT WIRKSWORTH, DERBYSHIRE.

THOMAS GIBBS.

MY late father made regular observations of rainfall at his residence, Bridge House, Wirksworth, from the beginning of 1890 until his death in February, 1911. As the gauge has now been moved to another station and the record thus broken I propose in this paper to summarise the 21 years' record.

Wirksworth is situated at the head of the valley of the little river Ecclesbourne, a tributary of the Derwent which joins the principal stream at Duffield 9 miles to the South, and at the South Eastern corner of the great limestone plateau of West Derbyshire. The town itself stands at an altitude of between 450 and 700 feet above sea level and is situated in an amphitheatre of high hills, Barrel Edge, an escarpment of Kinder Scout Grit about a mile to the North-East exceeding 1000 feet and the limestone plateau of Middleton Moor, about two miles to the North West, reaching 1173 feet above sea level. Between these two eminences a ridge of about 750 feet elevation closes in the valley on the North. The gauge was 500 feet above sea level, and its receiving surface was one foot above the ground.

Unfortunately for the first five years of the term only the years' totals have been preserved, so that we have complete daily and monthly records for a period of sixteen years only. In the following table (page 106) I give the monthly and yearly rainfall from 1895 to 1910, both years included, and also the totals for the five years 1890-1894.

The average yearly rainfall for the whole period of 21 years was 32.73 inches. The wettest year was 1900 in which the total fall was 41.27 inches or 1.24 of the average. The driest was 1893 with a fall of 22.77 inches or 0.70 of the average. The wettest three consecutive years were the last of the series, viz., 1908, 1909, and 1910, the average for the three years being 36.36 inches. The driest were 1892-3-4 with an average of 27 inches.

In the second table (p. 107) I give the average rainfall for each month for the sixteen years 1895-1910, together with the percentage which each month's average bears to the year's fall. For the purpose of comparison I have added similar figures taken from two other records covering the same period, viz.:—Burton-on-Trent, from the Reports and Transactions of the Burton Natural History and Archaeological Society, and Wetwang, East Yorkshire, from Dr. H. R. Mill's paper in 'The Naturalist,' 1911, pp., 251-3.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
1890	..	..	..	..	..	..	..	..	..	..	..	..	26.67
1891	..	..	..	..	..	..	..	..	..	..	..	..	40.66
1892	..	..	..	..	..	..	..	..	..	..	..	..	28.69
1893	..	..	..	..	..	..	..	..	..	..	..	..	22.77
1894	..	..	..	..	..	..	..	..	..	..	..	..	29.55
1895	5.09	0.53	2.98	2.22	0.85	1.24	5.51	2.12	0.82	2.90	4.41	3.23	31.90
1896	1.48	1.04	3.81	1.27	0.36	3.15	1.51	2.25	6.18	3.96	1.48	5.86	32.35
1897	2.65	4.03	3.56	2.40	1.92	3.36	0.94	3.26	3.55	1.48	3.95	4.25	35.35
1898	1.91	2.45	1.55	2.80	2.97	1.43	1.47	3.70	0.79	4.37	3.38	3.27	30.09
1899	44.6	2.33	1.56	3.47	3.24	1.88	1.30	0.74	5.16	2.93	1.75	3.02	31.84
1900	5.64	5.11	1.07	1.59	1.89	3.90	4.07	4.70	0.98	3.81	3.26	5.25	41.27
1901	2.94	1.30	2.99	1.92	1.10	2.03	3.37	1.91	1.14	2.43	4.01	7.08	32.22
1902	1.59	2.05	1.60	3.04	2.88	1.56	1.93	3.66	1.80	3.17	3.11	2.44	28.83
1903	2.69	1.45	4.26	2.00	2.97	1.12	3.26	5.21	4.40	7.37	2.80	1.79	39.32
1904	3.61	4.67	2.27	2.03	1.20	0.64	2.60	4.05	2.19	0.70	1.63	2.18	27.77
1905	1.51	1.44	4.11	2.69	0.52	2.70	0.98	4.46	1.91	2.07	4.00	0.71	27.10
1906	4.84	4.58	2.41	1.11	2.61	1.93	1.05	2.44	1.10	7.04	3.30	3.21	35.62
1907	1.57	2.88	1.83	1.84	3.77	4.51	3.31	3.60	0.73	5.12	3.74	3.41	36.31
1908	1.70	2.24	3.69	3.03	3.52	1.64	3.28	3.79	2.78	1.23	1.86	2.85	31.61
1909	1.46	0.86	4.06	1.77	2.39	4.52	4.01	2.84	2.41	5.73	0.86	6.49	37.40
1910	3.66	3.88	0.96	3.72	2.62	1.91	3.19	5.62	0.39	2.56	5.95	5.60	40.06

From this second table it will be seen that along with a general agreement there are certain differences in the distribution of rainfall throughout the year in the three localities. In all the wettest months were August, October and December, but while at Wirksworth, the first place is taken by December, with October second and August third, at Burton August is

	WIRKSWORTH.		BURTON.		WETWANG.	
	Averages for years 1895-1910.	Percentages of year's Totals.	Averages, 1895-1910.	Percent'ges.	Averages, 1895-1910.	Percent'ges.
January ..	2.92	8.7	1.90	7.5	1.75	7.0
February ..	2.55	7.5	1.65	6.5	1.66	6.6
March ..	2.66	7.9	1.75	6.9	1.99	8.0
April ..	2.31	6.9	1.70	6.7	1.67	6.7
May ..	2.18	6.5	2.00	7.8	1.70	6.8
June ..	2.35	7.0	2.03	8.0	1.98	7.9
July ..	2.61	7.7	2.27	8.9	1.84	7.4
August ..	3.40	10.1	2.97	11.7	2.84	11.4
September ..	2.27	6.7	1.71	6.7	1.50	6.0
October ..	3.55	10.5	2.69	10.5	3.00	12.0
November ..	3.09	9.2	2.10	8.2	2.37	9.5
December ..	3.79	11.3	2.71	10.6	2.68	10.7
	33.68	100.0	25.48	100.0	24.98	100.0

easily at the top, October and December coming next and being practically equal, while at Wetwang, October is the wettest month, followed in order by August and December. At the other end of the scale the three driest months are at Wirksworth, May, September and April in the order named; at Burton, February, April and September, and at Wetwang, September, February, May.

By grouping the months in the four seasons, viz. :—*Spring*, March, April, May; *Summer*, June, July, August; *Autumn*, September, October, November; *Winter*, December, January, February, we get the following results :—

PERCENTAGE OF YEAR'S RAINFALL.

Season.	Wirksworth.	Burton.	Wetwang.
Spring	21.3	21.4	21.5
Summer	24.8	28.6	26.7
Autumn	26.4	25.4	27.5
Winter	27.5	24.6	24.3

It will be noticed that at Wirksworth, the Winter is the wettest quarter; at Burton, the Summer, and at Wetwang, the Autumn; while at all three stations the Spring is the driest. At Wirksworth and Burton, the figures for the Winter and Summer quarters are practically reversed. This may probably be accounted for by the greater proportion which thunder-rain bears to ordinary cyclonic rain in the lowlands as compared with the hill country; thunderstorms being of course more frequent in the summer months.

The last point which I wish to bring out is to answer the question "What is the true average yearly rainfall at Wirksworth."? The average for the 16 years, 1895-1910 was 33.68 inches, that for the 21 years ending 1910, 32.73 inches, but even the longer period is not sufficient to form the basis of a reliable average. This is proved by comparing the averages at Burton and Wetwang for the years 1890 to 1910 with the complete series of 35 and 29 years which the records respectively cover, the figures being:—

Burton 1890-1910, 24.70 in. 1876-1910, 26.22 in.

Wetwang 1890-1910, 25.40 in. 1876-1910, 26.28 in.

The considerable deficiency in the average for the shorter periods is accounted for by the fact that the omitted years, viz.: at Burton, 1876-1889, and at Wetwang, 1882-1889, were with very few exceptions, years of more than average rainfall. As Burton is not very far distant from Wirksworth (about 20 miles) and 35 years is generally considered a fair period from which to deduce an average, I have used this record from which to deduce the probable true average rainfall for Wirksworth. As stated, the Wirksworth average for the years 1890-1910 is 32.73 inches; the Burton average for the same period is 24.70 inches. The Wirksworth average is therefore 1.325 of the Burton average. Applying this ratio to the Burton 35 year average of 26.22 inches we get an estimated 35 year average for Wirksworth of 34.74 inches.

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Hull Museum Publication No. 90, being the 42nd Quarterly Record of Additions, contains pictures and illustrations of old shipping views, Roman remains, numerous short notes, and a reprint of Mr. Sheppard's paper in *The Naturalist* on Early Microscopes. A. Brown & Sons, 28 pp., 1d.

Guide to the Collection of Gemstones in the Museum of Practical Geology, by W. F. McLintock. London: Fisher Unwin, 92 pp., 9d.—This Guide deals not only with the collection as displayed in the Museum, but also with the general properties of gemstones, the characters by which they may be identified, the various methods of cutting them so as to enhance their beauty, and the processes by which they have been imitated, modified, and in some cases artificially formed. All the more important gemstones are represented in the Collection, both in the rough state and also cut, polished, and, in a few cases, mounted as articles of jewellery. The Guide is illustrated.

RITTERIA NEMORUM KOCH.

C. F. GEORGE, M.R.C.S.,
Kirton-in-Lindsey.

(PLATE VII.).

THIS mite is one of the most interesting as well as the most abundant and most widely distributed of all the Rhyncholophidæ I have met with. Individual specimens differ considerably in appearance from each other in size, shape, and colour when alive, or when long preserved or compressed, hence the necessity of examining their structure before deciding their specific names. I have fortunately been able to supply Mr. Soar with a living and rather fine and typical example of *Ritteria nemorum*, and he has made a good drawing of this individual. The representation of the wrinkles is a rather difficult matter, the creatures having the power as well as the habit of altering them at will. This habit is also to be observed in other members of the Velvet mites.

With regard to its anatomy, in *The Naturalist*, for May, 1907, page 180, is a figure of the mite (by mistake named *Erythræus*) and also a good enlarged figure of the mandibles and palpi. The crista is rather difficult to make out, especially in the living mite, in consequence of the number and position of the rather short, thick, and dark papillæ in its neighbourhood. The upper part of it is indicated by the round mark seen in the figure on the anterior and central part of the cephalothorax. I have, however, been able to dissect it sufficiently for Mr. Soar to make a much enlarged drawing (see Fig. A). It consists of a chitinous rod, with a more or less oval form of loop at either end, the anterior one being the larger. Within these loops, but on a higher level, there are two stigmata, each furnished with a tactile hair projecting obliquely outwards (the posterior ones only are shown in the figure). The whole is placed on a wider and irregularly broader chitinous plate. It will be observed that the crista differs somewhat from any one of those figured in *The Naturalist* for May, 1911, page 200. This fact seems to indicate the importance of examining this structure in all the Trombidiidæ. Lamarck, in his *Histoire Naturelle des Sans-Vertébrés*, published in 1818, divided the Acari into those having six feet and those having eight feet. The six footed ones into three families (1) *Astoma*; (2) *Leptus* and (3) *Caris*. Since Lamarck's time these six-footed mites have been proved to be only the larval forms of mature mites. In the proceedings of the Royal Physical Society of Edinburgh, for 1910, Vol. XVIII., page 100-101, XII.,* will be found

* Note on *Leptus phalangii* and *Leptus autumnalis* and their parent earthmites by William Evans, F.R.S.E.

an account of how Mr. Evans was able to trace the development of *Leptus phalangii* to its next or nymphal state. Having cast its larval skin and obtained another pair of legs it was easily recognised as *Ritteria nemorum*. The life circle then is as follows:—First the mature female, *Ritteria*, lays eggs. These eggs hatch and develop into small larvæ, which become parasitic on *Phalangium opilio* and perhaps also on other species of *Phalangium*. On reaching their full larval development they cast their skins, leave their hosts and become nymphs, and these ultimately develop into adult mites, *Ritteria nemorum*. Of course the same process is passed through by other species, but this is so far as I know the only case of a *Trombidium* being fairly traced from one stage to another, although it is many years since I traced the development of a parasitic larva of the Great Water Beetle to its nymphal stage of *Hydrachna*, but this was a much easier matter as the Beetle could be imprisoned in an aquarium until the larva became developed into a free swimming mite.

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NORTHERN NEWS.

Dr. Alfred Russel Wallace was 90 years of age on 8th January.

According to the Press, a jay has been found in the Washburn Valley.

A great auk's egg, said to be 'the very finest of its type,' was sold at Stevens' rooms recently for 220 guineas.

The Rev. Hilderic Friend has described three new species of worms, from Nottinghamshire, to the Royal Microscopical Society.

'Natural Gas from a Bradford Bore' has been announced in one of the Yorkshire papers. But it has no reference to any public speaker.

The zoological collections formed by Thomas Pennant in the eighteenth century have been presented to the Natural History Museum, South Kensington, by Lord Denbigh.

At a recent meeting of the Royal Society, Dr. T. Rettie read a paper on 'A Gregarine: *Steinina rotundata* nov. sp.—present in the mid-gut of bird-fleas of the genus *Ceratophyllus*.'

Mr. C. Crossland favours us with a reprint of Parts. III. and IV. of Contributions to Halifax Bibliography and Authors, which are devoted to Natural History items. They occupy 72 pages, and are reprinted from the *Transactions of the Halifax Antiquarian Society*.

Mr. A. Leslie Armstrong, of Sheffield, sends us the following note in reference to 'A Blackbird Suffragette.'—'A remarkable instance of what appears to be the far-reaching influence of Mr. and Mrs. Pethick Lawrence has recently been brought to my notice. A pair of blackbirds during last nesting season elected to build in the boundary hedge of the Lawrence's villa at Dorking, and, presumably, to show their loyalty to 'the cause,' founded the structure upon a large piece of the *Daily Chronicle* containing news of Suffragette activities, which had been carefully laid in the desired position. Other fragments of the same newspaper were woven into the nest itself, a large piece was hanging from it on one side, and one or two pieces were prominently placed about the margin in convenient positions for study during the weary hours of incubation.'

ON THE ORIGIN OF THE ARANEIDAL FAUNA OF YORKSHIRE.

WM. FALCONER,
Slaithwaite, Huddersfield.

THE Naturalist who studies plants and animals in a living state in their native haunts in order to discover for himself the fascinating details of their life history, habits and instincts, is often led in consequence of his observations in the field, to the consideration of other subjects equally interesting, but from their very nature highly speculative in character. In none of them is there more scope for surmise and theory than in the endeavour to trace the origin of the existing fauna and flora of any area, with all the varied and difficult problems which they present as the resultant of the manifold and complex influences to which they have been subjected, and to which, as living organisms endowed with a certain capacity to adapt themselves to the external circumstances of their environment, they have responded, through the immense period which has elapsed since their creation.

Such small and economically useless creatures as spiders, which keep mostly in strict seclusion and do not therefore obtrude themselves upon one's notice, have never at any time been subjected by man to such general and continuous observation as the larger, more conspicuous and useful animals and plants have been. Neither do their soft bodies adapt themselves to permanent record in the rocks; nevertheless they can boast of a considerable antiquity, for out of the countless myriads which must have lived, died, and left no sign, some 250 fossil species, a large proportion of which are referable to existing genera, are known to science, the most ancient example having been unearthed in Upper Silesia from Carboniferous strata of the Palæozoic Epoch. The remains of 180 of them, however, were not preserved in the sedimentary rocks, but in a much more effective medium for the purpose—amber. Had this testimony of the rocks been wanting their world-wide distribution and highly specialised form would still have pointed to the same conclusion.

The County of Yorkshire from its geographical position and its relatively small size, can only be regarded as a part of a very much larger area, and consequently in treating of the origin of its spider population, consideration must be given not only to the known distributional range of the various species outside its limits, but also to the factors which, in the past, may have governed it. This has already been done to a greater or less extent in the case of the larger organisms, the range of which, both in time and space, has been fairly fully ascertained, so that it is possible to state with some degree

of probability from what quarter they entered and in what direction they spread over the British Isles. As their geological records show, spiders have an equal antiquity and must necessarily have come under the operation of the same natural laws and been acted upon by the same influences, and we may therefore feel sure that they came to this country in a similar way to their larger and better known neighbours.

The most generally accepted theory of plant and animal distribution, and the one which most accurately accords with known facts is that of Prof. E. Forbes's* specific centres from which the different forms diffused as organic and physical conditions permitted to the surrounding districts; utilising as a means of access to the British Isles those land connections which anciently united them at different times to adjacent parts of the Continent, but which subsequently were entirely, or as in the case of the one to the north, of which the highest points, now known as the Orkneys, Shetlands, Faroe Islands and Iceland still remain above the sea, only partially submerged. It is probable that, since the creation of the existing fauna and flora, several such oscillations of levels—long periods of depression and elevation—have occurred, each producing important modifications in the distribution of land and sea and undoubtedly also giving rise to corresponding variations in temperature and in the quantity and duration both of winds and rains. Any one, or combination of new conditions, whenever they obtained cannot but have exercised the greatest and most far reaching effects on the various organisms, favouring some which would rapidly increase in numbers and overrun large tracts of land, but adversely affecting others which would as quickly decrease and eventually give way before the more vigorous and dominant forms.

Physical causes alone, however, are not sufficient in themselves to account for the present distribution of plants and animals. Other influences not of a material kind like those already enumerated, have had an equal if not greater share in determining the limits of their extension. Just as the organism which failed to adapt itself to the demands of its physical environment, would give way before one which could, so would it also be eliminated if it failed to respond to the co-existing organic conditions while the more adaptive species would increase and flourish. These directing forces are still operative, imperceptible as of yore, and chief amongst them in its power to influence distribution is that keen competition for a due share of the food so vital to every form of life, which is the result of the strenuous conditions of overcrowding, which, induced by the enormous multiplication of individuals, obtains

* Flora and Fauna of the British Isles. Mem. Geol. Survey.

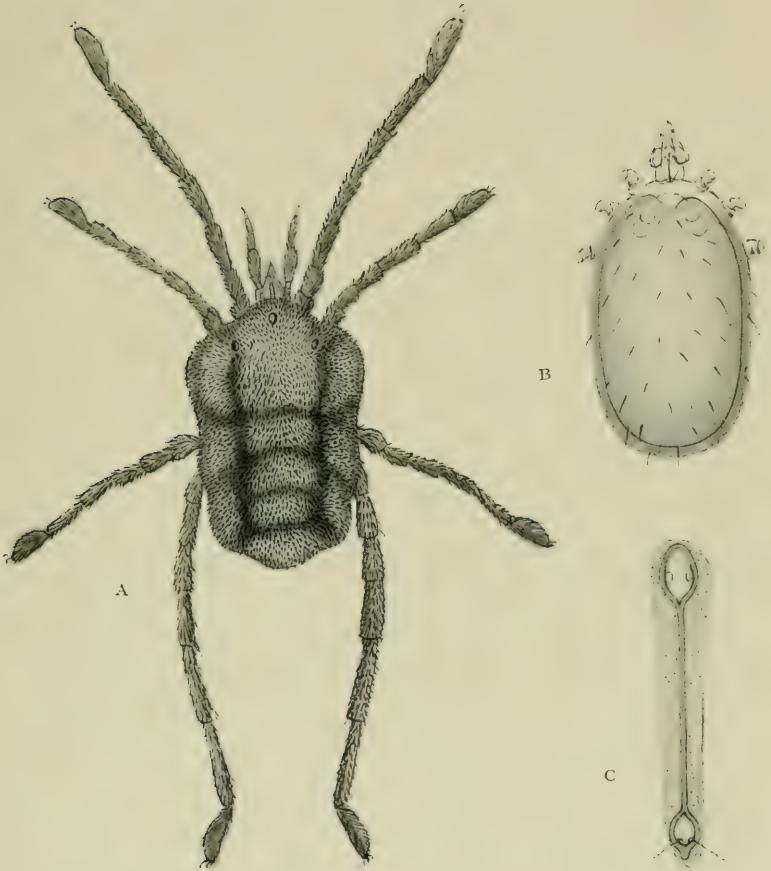


Fig. A.—*Ritteria nemorum* Koch. $\times 18$.

Fig. B.—Ventral aspect. $\times 40$.

Fig. C.—Crista. $\times 84$.

so continuously in both the animal and vegetable kingdoms. This must have operated also in the case of spiders and helped to produce those wonderful modifications of structure and modes of life, the one adapted to the other, which have enabled them to occupy the most diverse situations, and to become one of the most widely diffused animals on the face of the earth. While some are not particular what these situations may be, the greater number have appropriated to themselves special habitats, in the absence of which it would be useless to search for them; for example, *Tegenaria derhamii* Scop. confines itself to buildings; *Erigone longipalpis* Sund. and *Halorates reprobus* Camb. haunt the sea coast; *Drapetisca socialis* Sund. and *Styloctetor penicillatus* Westr. frequent tree trunks; *Salticus scenicus* Clerck searches walls; *Evansia merens* Camb. is an inhabitant of ant's nests; *Trochosa picta* Hahn hunts over sandy tracts; *Argyroneta aquatica* Latr. attaches its bell-like retreat to the submerged stems of water plants; *Pirata piraticus* Clerck, *P. hygrophilus* Thor., *Dolomedes fimbriatus* Walck. live in watery places and can on occasion descend into the water; *Misumena vatia* Clerck. lurks in flowers to seize their insect visitors.

Such specialisation amongst spiders is far from being exhausted by the examples given above. This same diversity of structure and mode of life has in itself a tendency to disseminate the species, for the necessity under which these creatures are often laid of finding an unoccupied habitat of the kind required and in competition with others of enlarging the area from which a sufficient supply of food can be drawn must constitute an ever present and all powerful incentive to spread. To assist them in this dispersal, they have acquired the power, extraordinary in creatures unprovided with wings and remarkable also for the simple means by which it is apparently accomplished, of sailing through the air. No combined movement is made, but each individual rises and floats away by itself. Single floating threads are not easily detected, and it is very probable that this habit of aviation is much commoner and more widespread among spiders than is usually supposed. The intending aeronaut climbs to the top of a post, gate or bush, and elevating its abdomen, emits from its spinners a long filament on which it is borne rapidly through the air to a considerable distance and often at a great height. Most naturalists will have at least read the accounts of this phenomenon in White's Selborne Letter XXIII. to Hon. D. Barrington and Dr. Lister's De Araneae as given in Kirby and Spence's 'Entomology' Letter XXIII, but if not can readily turn to them. It is difficult to believe, however, that nothing more than the filament and the assistance of the wind is needed to effect this wonderful flight. Under atmospheric conditions of

moisture and varying temperature, the threads descend, and reinforced by fragments of webs blown from their moorings by gusts of wind form the familiar 'gossamer showers.' Among those specially addicted to the practice are adults of the smaller and less weighty kinds, species of the genera *Erigone*, *Savignia*, *Dicymbium* and *Edothorax*, and in spring and autumn the young of many others. Darwin in the 'Voyage of the Beagle,' Chapter VII. mentions that on several occasions thousands of a small spider of the same species but of both sexes and all ages settled on board the ship when 60 miles from land and could therefore have only done so after a lengthy aerial flight. In Chapter I. of the same work he states that spiders are among the earliest inhabitants on newly formed oceanic land, a striking testimony to their powers of dissemination. Mr. W. H. Hudson, in his 'Naturalist in La Plata,' also relates a remarkable instance of aerial dispersal on a gigantic scale which he witnessed near Buenos Ayres. In this case the filaments of a countless number of spiders, representatives of four different species awaiting more favourable meteorological conditions to continue their journey, were in such abundance as almost to hide the grass and thistles beneath them and formed a continuous band twenty yards wide which was followed for two miles without finding the end.

The interchange of natural vegetable productions obviously furnishes an easy and simple means for the accidental transference from place to place on the earth's surface of even soft bodied creatures like spiders which are, moreover, tenacious of life and able to endure long fasts. Their eggs may also thus be carried, or if the trees, in the cracks and beneath the bark of which many kinds conceal their egg sacs, should become derelict, they are often drifted a considerable distance before again reaching land. Instances of living spiders of various species being brought to this country from foreign lands in consignments of bananas, oranges, logwood, etc., are now frequent and familiar. Examples of the kind may be frequently found in museums, and at any seaport with foreign trade, collections of exotics, some of them new to science, may now be made. Circumstances do not favour these aliens, and as a rule they either get no chance to establish themselves or fail to find a suitable habitat. Some few which are natives of a warmer climate are known to have done so, having found congenial shelter in greenhouses, hothouses and nurseries and are believed not only to have been introduced but also disseminated in such places with exotic plants. Two of these have been met with in Yorkshire—one, *Theridion tepidariorum* C. L. Koch is now very common in most British greenhouses, and the other, *Hasarius adansonii* Say., very much rarer in hothouses.

(To be continued).

FIELD NOTES.

BIRDS.

Glossy Ibis in Holderness.—On October 18th, 1912, a Glossy Ibis ♀, was shot at Carlton, near Aldborough, in Holderness, by Mr. Wood, of Humbleton, who reported that he saw another bird, which he did not secure. Apparently it is a bird of the year, showing flecks of grey on the crown of the head and throat, with very little of the metallic gloss observable in adult birds.—E. W. WADE, Hull.

Little Auks in Holderness.—On January 15th, 1913, a Little Auk was picked up dead in a Timber Yard at the Victoria Dock, Hull; the bill completely shattered by coming into contact with a shed. It was in very emaciated condition.—E. W. WADE, Hull.

[Another specimen, in very good condition, was sent to us by Mr. J. Wilkinson, Withernsea, on January 18th, and a further example was picked up on the golf course, Bridlington, on the 19th.—ED.]

Jays near Penrith and in Roxburghshire.—Although the Jay is not rare in some parts of the Lake District it may be worth while recording that on 24th November, I saw a couple of them (from the screaming there might have been more hidden amongst the thick fir trees) going to roost in the Beacon Wood near Penrith.

More than one has been reported this autumn from the neighbourhood of Jedburgh, and Kelso, in Roxburghshire, where the bird can only be claimed as a rare occasional visitant; its visits being always curtailed by the zeal of gamekeepers, or those in quest of feathers for the 'bussing of flees.'—GEORGE BOLAM.

The Occurrence of Sand Grouse in Yorkshire.—In the autumn, Mr. St. Quintin reported to me that a flock had been seen and suggested that a note might be put into the principal County papers to prevent the slaughter which has attended previous visits. The birds were seen on October 20th by Mr. Cooper, of Aislaby Hall, upon his moor at Lockton. I confess that I thought it more than probable that a flock of Golden Plover had been mistaken for Sand Grouse, but Mr. Cooper knows both species well and is not likely to have made an error. The following extracts from letters to Mr. St. Quintin show there is little possibility of mistake. 'I guessed the number at 160, they passed me about 20 yards off and flying close to the ground. I never shoot these aliens. I thought the grouse were birds of passage. At the time I saw them they were flying North.' In reply to a further enquiry, Mr. Cooper wrote 'My record of Pallas's Sand Grouse is quite correct. The

familiar "twit, twit" of course caused me to notice them before they approached from behind. I have seen the grouse very many times in different districts in Yorkshire. I had a flock of over 200 at Patrington on a farm for months.'

'I have observed them at Lockton, Cropton, Aislaby, Hackness and many times on Dalby Warren, Hunmanby, Speeton and other districts on the wolds.'

'What I took to be the Banded Sand grouse *Pterocles arenarius*, I found had no cry when flying unless after sunset. I have often watched the grouse take a header into the "Kafue," N.W.R. by the thousand. It used to remind me of so many bullets striking the water.'—R. FORTUNE.

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LEPIDOPTERA.

***Nonagria arundineta* in Yorkshire.**—I was recently looking through a small collection of Lepidoptera made here over 20 years ago, and among the Noctuæ found some *N. neurica*. I have since seen the gentleman who made the collection, and have verified the particulars of the capture.—C. ASH, Saxton Vicarage, Tadcaster, January 8th, 1912.

No doubt the insect here alluded to by Mr. Ash is the *Nonagria arundineta* of Schmidt, which up to the year 1908 had always done duty in our collections as the *neurica* of Hübner. In that year, however, a *Nonagria* was found in Sussex having a clear white collar or crest, which turned out to be the true *neurica*, and necessitated the relabelling of all our previous cabinet specimens as *arundineta*. The true *neurica* has been taken every year since its discovery in some numbers, but I believe only in the one ditch where it was first found. A coloured figure of it, with its history, will be found in the *Entomologist's Monthly Magazine* of September, 1911. Mr. Ash's record of *arundineta* is the first for Yorkshire.—

G.T.P.

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MOSSES.

***Ulota phyllantha* Brid. in Cumberland.**—On June 18th last, I gathered a small tuft of this moss from the trunk of a tree in the woods about Netherby, in the extreme N.W. of this county. The leaves showed the characteristic gemmæ, and the name has been kindly confirmed by Mr. W. Ingham. It is new to V.C. 70.—JAS. MURRAY, Carlisle.

Under the startling heading 'Locked Among Lions,' we found a reference in the press recently to two youths who 'found themselves locked in among human skeletons, stuffed lions, and other animals in the Middlesbro' Museum. After searching in the dim light, they were able to reach an outside window, from which they signalled to a passer-by.'

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VERTEBRATE ZOOLOGY IN YORKSHIRE.

At the last meeting of the Vertebrate Section of the Yorkshire Naturalists' Union, held at Leeds, Mr. J. W. Taylor presided in the afternoon, and Mr. Oxley Grabham, in the evening. Reports on the work in the three Ridings were given by Messrs. Fortune, Wade and Nelson, respectively.

Mr. Wade's report referred to the scarcity of certain migrants in the Spring of 1912, owing to adverse climatic conditions; expressing the opinion that these birds had stayed in the South of England for breeding. Mr. Booth stated that his observations led him to believe that unfavourable weather at the destination had no influence on the scarcity or abundance of these migrants—good weather on the route from their winter quarters was the great factor in determining their numbers in their usual breeding haunts.

Mr. H. B. Booth was elected President of the Section for 1913; Mr. Riley Fortune, President of the Mammals, etc., Committee; and, with slight changes, the officers of the Birds' Protection Committee were re-elected. Particulars of these will duly appear on the Union's membership cards.

Mr. S. H. Smith exhibited a specimen of a 1911 Great Northern Diver in Winter plumage, which was shot at East Cottingworth on November 15th, 1912. Mr. G. H. Parkin exhibited a Fluke (in spirit) taken from a Stickleback, and a Little Auk in the flesh, killed in Leeds recently, and an abnormal young Meadow Pipit, which bore strong resemblance to a light-coloured canary. The wings were of a beautiful lemon yellow, the remainder of the plumage being a much lighter shade. The other nestlings were of the normal type. Mr. Mitchell exhibited a concretion taken from a 12-year-old horse at Beeston. The stone weighed 6 lbs. 10 ozs., and had been cut into various sections in order to show the construction in detail.

Mr. M. Robinson explained that these 'bowel' stones were well known to 'Vets.', and invariably had their origin in a small piece of metal or other hard substance, around which lime salts formed in concentric rings. Their presence could not be diagnosed until they had developed to such a size as to induce restlessness in the horse.

Dr. Heatherley shewed several castings of the Peregrine Falcon, and one of the White tailed Eagle, collected by Mr. Selous, one of the former having been teased out in water to ascertain the contents, which proved to be almost entirely of feathers and down. Mr. George Mitchell, of Upwood, a practical Falconer, said the feathers were used to clear the crop of mucus, which, if not removed, caused the birds to be lazy. The consistency of the castings was carefully noted, as this is a sure indication of the health; if somewhat hard, the health was good, while those of a soft nature denoted unsound condition. Mr. Mitchell also exhibited hoods, bells and jesses used in Falconry, and described the method of fixing them. The hoods are made in North Brabant, where the handicraft has been practised by certain families for many generations. Here also systematic trapping of Falcons was carried on during migration, by the means of bow-nets and pigeons, and with the aid of shrikes which act as pointers, and the methods employed were lucidly explained. The best bells are those of Indian manufacture, being very light in construction and possessing a good tone.

Mr. Grabham described his experiences with Mr. St. Quintin's Hawks and Falcons, particularly the flying of Goshawks at rats, which were bolted by ferrets. Mr. Mitchell explained that the name 'Tiercel' had reference to the comparative sizes of the two sexes, the male bird being a third less in size than the female.

Dr. Heatherley, with the help of a long series of slides taken during three years' observations, gave an instructive account of 'The Home Life of the Peregrine Falcon,' and he also shewed several interesting slides of the Grey Seal, taken by Mr. King.

Mr. H. B. Booth showed some slides kindly lent by Mr. Mitchell, illustrating the sport of Falconry.

Mr. E. W. Taylor read a paper on "Moorland Birds," illustrated by lantern slides. He started at the lower reaches of a typical moorland stream up to the wide stretch of a Yorkshire moor; the successive types of landscape were shown, and the characteristic avi-fauna of each habitat was dealt with. With few exceptions, such as the Dotterel and Dunlin, a most comprehensive series of photographs of our moorland birds had been obtained, which greatly enhanced a very interesting paper. Mr. Taylor spoke of the significance of the white rump of the Chat family and others, but owing to the late hour no discussion on this question was practicable.

A. H. L.

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SOME BOOKS ON GEOLOGY.

The Student's Handbook of Stratigraphical Geology, by A. J. Jukes-Browne. Second Edition, London: E. Stanford, xiv. + 668 pp., 12s. net. Mr. Jukes-Browne's long connection with the Geological Survey, and the valuable monographs he has prepared, peculiarly qualify him for a standard work on Stratigraphical Geology, a subject he has made his own. The first edition of the book was well known and well read, so much so that we need hardly occupy space in describing it to our geological readers. The present edition is considerably enlarged, and many more illustrations have been added. A new feature is the greater prominence given to the Continental representatives of the English beds. The author has also had the advantage of the advice of many specialists, and a particularly valuable service has been rendered by Mr. Woods in revising the descriptions and lists of fossils and amending the nomenclature. A useful feature is the list of references which follows each chapter, so that the student may readily consult the more important memoirs bearing upon any particular subject in which he may be interested. There are over two hundred illustrations, principally of typical fossils.

An Introduction to British Clays, Shales, and Sands, by Alfred B. Searle. London: C. Griffin & Co., pp. xii. + 451. Mr. Searle is a clay specialist, and in this addition to Messrs. Griffin's series of technological handbooks, a want has been well supplied. The economical value of clays and clay products has warranted such a publication for some time, and certainly Mr. Searle seems to have dealt with the subject in a very thorough and practical manner. There are twelve chapters, dealing with the formation of clays from igneous rocks, sedimentary rocks, how recent clays were formed, characteristics of clays and shales, mineral constituents, physical and chemical properties, prospecting, mining and purification of clays, and 'the legal position of clays.' There does not seem to be any aspect of clays that has not been touched upon. As a frontispiece is a map showing the chief clayworks in Great Britain. Besides those around Hull, we notice there is one only in Holderness, presumably that at Withernsea. It is odd to read a description of a map showing the distribution of boulder drift 'after Wright and Bonney'! This unique linking of two names is probably due to the fact that in his 'Ice-Work' Professor Bonney commanded Professor Wright's map, and as no acknowledgment was made, Mr. Searle has naturally assumed that it had some of Professor Bonney's work upon it. Unfortunately the illustration of a 'Typical Ammonite from the Speeton Clay,' reproduced from *The Naturalist*, is a Kimmeridge Clay species, though from Speeton. But these are minor points. Anyone desiring information on clays must refer to Mr. Searle's volume.

The Natural History of Clay, by A. B. Searle. Cambridge, 1912, pp. viii. + 176. After giving a table of clay rocks, Mr. Searle occupies one of the admirable shilling 'Cambridge Manuals' by dealing with the chemical and physical properties of clays, clay and associated rocks, origins and

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modes of accumulation, clays of commercial importance, clay-substance, theoretical and actual, and a bibliography. In non-technical language the book gives a good account of the nature and importance of clays, pottery, etc. It is also printed by John Clay. We cannot say whether the smooth surface of the paper on which it is printed is due to clay or not, though that material certainly plays an important part in the manufacture of glazed art papers. A good proportion of the few illustrations refer to Yorkshire, and two are from *The Naturalist*.

Building Stones and Clays, their Origin, Characters, and Examination, by E. C. Eckel. New York: J. Wiley & Sons; London: Chapman & Hall, xvi. + 264 pp., 12s. 6d. net. Almost simultaneously with Mr. Searle's volume which refers to English clays and English methods of dealing with them, appears Mr. Eckel's work, covering similar ground, but based upon American materials and American experience. 'Tis interesting to compare the two. Mr. Eckel, however, is comparatively brief in his remarks, as he also deals with building stones, sandstones, limestones, igneous rocks, etc. The author has written memoirs on cements, for the United States Geological Survey, and is well known from his practical knowledge of the subject with which he treats. He pays special attention to the valuation and examination of clays and stone properties. There are also extensive lists of memoirs, etc., bearing upon the various subjects dealt with, to which the student may make reference.

Geological and Topographical Maps: their Interpretation and Use. A Handbook for the Geologist and Civil Engineer, by A. R. Derryhouse. London: Edwin Arnold, 133 pp., 4s. 6d. net.—Dr. Derryhouse and his work need no introduction to our readers. His training at the Leeds University, at which field geology is so prominent a feature, and his subsequent work in the north of Ireland, have enabled him to write with authority on maps and mapping, a subject by no means so easy as it looks. In his preface warm thanks are proffered to Professor Kendall, who has been the means of so many taking up the study of geology with enthusiasm and good result. Briefly, Dr. Derryhouse explains how the most information may be obtained from the Government geological and topographical maps, how they may best be read, what information they convey, how to draw maps, etc. Anyone engaged in practical field work, whether geological or engineering, will find the volume indispensable. We will admit that one or two of the illustrations are not quite clear to us, but that may not be the author's fault.

The Origin of Earthquakes, by Dr. C. Davison. Cambridge University Press, pp. viii. + 144, 1s.—We are glad to draw attention to this fascinating account of earthquakes from Dr. Davison, whose paper on Yorkshire earthquakes, which appeared in this journal, will be remembered by our readers. He naturally lays particular stress upon the lessons to be learnt from Japan, California, and India in regard to earthquakes, but he also has much to say about those which have occurred nearer home, as at Derby and Carlisle. There are a number of illustrations showing the effect of earthquakes upon the landscape, some of which are remarkable.

A Geological Excursion Handbook for the Bristol District, by S. H. Reynolds. London: Simpkin, Marshall, etc., & Co., 224 pp., 1s. It is always a pleasure to see a well-illustrated and practical geological guide to an interesting area, especially when it is written by someone particularly well acquainted with the different features of that area. Professor Reynolds's volume well describes the various geological phenomena in the district around Bristol, and the plan might well be copied in other areas. The volume also contains a charmingly-written 'Introduction' by Professor Lloyd Morgan.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Part 4 of Vol. IV. of the **Proceedings of the University of Durham Philosophical Society** contains a number of papers of interest to readers of *The Naturalist*, including 'Some Observations on the Effect of Soil Aeration on Plant Growth,' by C. Hunter; 'Analysis of a Florida Clay,' by Dr. A. A. Hall, and the Boulders Committee Report, No. 6, by Messrs. G. Weyman, F. Walker, D. Woolacott, and J. H. Smythe.

The Board of Agriculture and Fisheries has issued its valuable **Annual Report of Proceedings under Acts relating to Sea Fisheries for the Year 1911**. Wyman & Son, xlviii. + 174 pp., 1s. 11d. It is a useful record of our fishing industries, so arranged and classified that full facts and figures can be obtained at once in reference to the various species of fish that occur in the seas, quantities caught, value, etc., etc. Accompanying the Report are some elaborate charts.

The Transactions of the Entomological Society for 1912, Part III. are devoted to an elaborate and exhaustive article on 'The Comparative Anatomy of the Male Genital Tube in Coleoptera,' by Dr. D. Sharp and F. Muir. It contains 166 pages, and is illustrated by thirty-seven plates. With characteristic thoroughness the authors have ranged through almost all the families, and describe their results in detail, showing how these bear on phylogeny. The full value of the work cannot at present be estimated, but it is satisfactory to find that it confirms the general systematic position of the families as we now know them.

The South Eastern Naturalist, being the Transactions of the South Eastern Union for 1912, pp. lxxxii and 82, 3/6 net., besides elaborate reports of the Union's excursions, committees, etc., contains the presidential address of Lieut. Colonel Sir David Prain, on Botanical Bye-paths; the Alien Flora of Britain, by W. H. Griffin; The Flora of Folkstone, by G. C. Walton; Lepidopterous Case-Bearers, by A. Sich; Entomotraca from the Warren, Folkstone, by D. J. Scourfield; and Geology of the Warren, by W. F. Gwinnell. There are also one or two papers of antiquarian interest. An unusual and hardly 'scientific' illustration is that on plate vii, shewing 'A group of fossils from and in Gault clay.'

Vol. VII., part II. of the **Saga Book of the Viking Club** (1912, pp. 127-246, 7/6) is a further useful record of work accomplished by this energetic Club. Besides the usual records of meetings, etc., the *Saga Book* contains 'Two Derivations,' by Professor E. Bjorkman; Costumes, Jewels and Furniture in Viking Times, Dr. A. Bugge; Miniatures from Icelandic Manuscripts, Dr. H. Fett; William Herbert and his Scandinavian Poetry, Mr. W. F. Kirby; Early English Influence on the Danish Church, Rev. A. V. Storm; and Anglo Saxon silver Coins in Norway, by Dr. A. W. Brogger. The last refers to a hoard of nearly 800 coins, including 135 belonging to Aethelred, Canute, Edward the Confessor, etc. These were minted at Lincoln, York, Nottingham, etc.

In addition to the paper on Hydroid Zoophytes referred to on page 3 of *The Naturalist* for January, the **Proceedings of the Royal Physical Society**, Vol. XVIII, No. 4, contain a number of valuable contributions to Zoology, etc. These include notes on a parasite (*Bucentes geniculatus*) of *Tiprela*, by Dr. J. Rennie; An Aid in the Study of Nematocysts, by Mr. T. H. Taylor; Pelagic Organisms and Evolution, by Mr. J. G. Kerr; Rhizopoda of Gough Island, Dr. E. Penard; On *Docophorus bassanæ* and *Lipeurus staphylinoides*, by Mr. J. Waterson; A New Species of Hydracarina, by Mr. W. Williamson; Arctic Palæozoic Fossils, by Dr. G. W. Lee; and Mallophaga from the Little Auk, etc., by Mr. W. Evans. Each item is a valuable record of good work, and we should like to congratulate the Society and its Secretary, Dr. Ritchie, upon the excellence of its *Proceedings*.

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THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY
T. SHEPPARD, F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;

AND
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TECHNICAL COLLEGE, HUDDERSFIELD.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.H.S.
Prof. P. F. KENDALL, M.Sc., F.G.S., JOHN W. TAYLOR,
T. H. NELSON, M.B.O.U., WILLIAM WEST, F.L.S.,
RILEY FORTUNE, F.Z.S.

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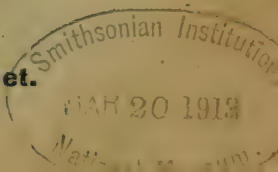
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A Monthly Illustrated Journal of Natural History for the North of England. Edited by T. SHEPPARD, F.G.S., Museum, Hull; and T. W. WOODHEAD, F.L.S., Technical College, Huddersfield; with the assistance as referees in Special Departments of J. GILBERT BAKER, F.R.S., F.L.S., PROF. PERCY F. KENDALL, M.Sc., F.G.S., T. H. NELSON, M.B.O.U., GEO. T. PORRITT, F.L.S., F.E.S., JOHN W. TAYLOR, WILLIAM WEST, F.L.S., and R. FORTUNE, F.Z.S. (Annual Subscription, payable in advance, 6/6 post free).

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All communications respecting 'The Naturalist' and publications should be addressed to T. Sheppard, F.G.S., The Museum, Hull; and enquiries respecting the Yorkshire Naturalists' Union should be addressed to the Hon. Secretaries, Technical College, Huddersfield.

NOTES AND COMMENTS.

NED HODGSON.

Visitors to the Cliffs at Bempton and Speeton during the coming summer will miss the cheery face and kindly greeting of Edward Hodgson. 'Old Ned,' as he was invariably called, died at the close of last year, after a few day's illness, aged 73



Photo by]

Ned Hodgson and his son John.

[E. W. Waide.

years. He represented the third generation of 'climbers' in his family, and his son John still carries on the arduous profession. For thirty years he regularly 'climmed' the cliffs for eggs, and only ceased on nearing his 60th year. He was one of the old school; kind to a fault, absolutely reliable, and 'as straight as a die.'

DR. BRAITHWAITE'S MOSS FLORA.

Our old friend and contributor, Dr. R. Braithwaite, F.R.S., and author of the well known Moss Flora, has sold his collection of mosses to the British Museum for £200. It is certainly a matter for congratulation that this unique collection is now in safe keeping, and available to students for all time. The Herbarium occupies 800 sheets of drawing paper folio, one sheet to each species, which itself is first mounted on a square of letter paper and then fixed by gum at the four corners, some very variable species have two, three or four sheets, and entirely arranged according to the 'Moss Flora.' These drop into stout millboard boxes, fifty or sixty in a box; the lid is formed by another box a little larger so as to keep out insects, and if any do get in they quickly get out again. There are about 8,000 specimens, some very beautiful, and they will rest near Wm. Wilson's collection. In May next, Dr. Braithwaite enters his ninetieth year, and we feel sure all our readers join us in wishing him every good wish on that occasion.

OUR NATIONAL ZOOLOGICAL COLLECTION.

Dr. A. Günther, F.R.S., has prepared a useful 'General History of the Department of Zoology from 1856 to 1895,' as an appendix to 'The History of the Collections contained in the Natural History Departments of the British Museum,' and this has been published by the Trustees.* There are many points of view from which this interesting history might be dealt with, but perhaps the part which appeals to one most is the extraordinary record of the various and numerous zoological collections which have found a permanent resting place in our National Museum.

TWO YEARS' ACQUISITION.

A fair sample of the record of additions to the Zoological Department alone may be taken from the list relating to the years, 1888-9, when 113,357 specimens were added to the collection. Among them were, from the *Challenger* collection, 2,315 crustaceans, 2,250 amphipods and isopods, 137 fishes, 545 tunicates, 400 Pteropods, 357 sponges, and several hundred other specimens of various kinds; a collection of marine animals from the China Sea, made by H.M.S. *Rambler*; a collection of deep sea animals dredged from the south-west coast of Ireland; mammals, etc., obtained by the Hunter expedition to Kilimandjaro and the Littledale expedition to the Pamir; 104 skulls of ancient Egyptians from Mummy Tombs; 11,000 North American birds; 108 specimens from the *Riocour* collection (purchased for £200); four large collections of birds; Francis Day collection of Indian fishes and

* pp. x. + 100. 5s.

crustaceans, and 155 British *Salmonidæ*; 2,558 marine shells from St. Helena; 2,111 shells from India; 5,635 Hemiptera from Central Europe; 3,143 Coleoptera; 6,246 Diptera; 1,407 Hymenoptera, etc.; the Buckle collection of Lepidoptera (6,000 specimens); the Hampson collection of Nilgiri Lepidoptera (2,418 examples, 'and about 300 types of new species'!) and 2,400 Moths from New South Wales.

PROTECTIVE COLOURATION IN BUTTERFLIES.

The Rev. F. Bennett points out an interesting feature with regard to butterflies in *Knowledge*, for February. These insects close their wings like a book, and the underside of the hinder pair is often coloured so as to match their surroundings; but they are not quite so large as the fore wings, and therefore do not cover these completely up. The beautiful detail which Mr. Bennett illustrates is that the uncovered portion of the underside of the fore wing repeats in a great number of instances the pattern and colouring of the under surface of the hind wing and thus carries out to perfection the concealment; while the remainder of the under surface of the fore wing covered when at rest by the hind wing, has often quite different colouring, and is in many cases of most brilliant and conspicuous hues.

FOSSIL FLORA OF CLEVELAND.

At a recent meeting of the London Geological Society, Mr. H. Hamshaw Thomas described several plants collected by the Rev. G. J. Lane and Mr. T. W. Saunders in the Cleveland district, and other specimens obtained by himself from the Marske Quarry, and by the late Mr. Hawell, whose collection is now in the Dorman Memorial Museum, Middlesbrough. The Marske flora, which includes several types not hitherto recorded from the Jurassic plant-beds of Yorkshire, is believed to be of Middle Jurassic age; specimens previously identified as *Zamites buchianus* (Ett.) and *Nilssonina schaumbergensis* (Dunk.), Wealden species, are described respectively as a new species of *Pseudecten* and *Nilssonina orientalis* Heer.

RECENT DISCOVERIES.

The following species were dealt with:—*Equisetites columnaris* Brongn., *Sagenopteris phillipsi* (Brongn.) var. *major* Sew., *Laccopteris polypodioides* Brongn., *Dictyophyllum rugosum* L. & H., *Stachypteris halleri*, a new type recently described by the author, *Coniopteris hymenophylloides* Brongn., and *C. quinqueloba* (Phill.), *Todites williamsoni* (Brongn.), *Cladophlebis denticulata* Brongn., a new species of *Marattiopsis* (a genus not hitherto recorded from Yorkshire), *Williamsonia spectabilis* Nath. (microsporophylls of which were found by the author, throwing additional light on this type of flower), *W. whitbiensis* Nath., and a female strobilus identified as *W.* sp., *Zamites*

(*Williamsonia*) *gigas* L. & H., *Psilophyllum* (W.) *pecten* (Phill.), *Tæniopteris vittata* Brongn., *T. major* L. & H., *T. sp.*, *Wielandiella nilssoni* (Phill.) formerly known as *Anomozamites nilssoni*, *Otozamites feistmanteli* Zigno, *O. graphicus* (Leck. ex Bean MS.), *Dictyozamites hawelli* Sew., a Cycadean stem classified as *Wielandiella* sp., *Nilssonia mediana* (Leck, ex Bean MS.), *N. orientalis* Heer, a new species of *Pseudoctenis* (a genus recently founded on specimens of Cycadean fronds from the Upper Jurassic of Sutherland), *Ginkgo digitata* Brongn., *Baieria longifolia* (Pomel), *Czechanowskia murrayana* (L. & H.), *Elatides setosa* (Phill.), and *Taxites zamioides* (Leck. ex Bean MS.).

DERIVED CEPHALOPODA OF THE HOLDERNESS DRIFT

At the same meeting, Mr. C. Thompson read a paper in which he stated that although it has been known for a century that the Drift of Holderness is rich in derived fossils, for many years the collecting of them had been neglected. However, in recent years, collections of the cephalopoda have been made and it is now claimed that about a hundred and eighty species of ammonites are known from the glacial drift. There are two important points about these specimens; one, that large numbers are new to Yorkshire lists hitherto published; the other, that the matrix of many of them cannot be matched now by our land exposures.

FROM THE NORTH SEA BED.

The whole of the Lower Lias is so well represented by all its genera, and the rocky matrices are so characteristic, that it was urged that the ice plucked them from outcrops in the bed of a former North Sea; also that these outcrops show the continuity of the North Yorkshire Basin with that of North-Western Germany. The list appended to the paper showed that many gaps are now filled. The Middle and the Upper Lias afford much material, but the types are closer to those of North Yorkshire. The Oolites are very scantily represented, although the Lower Cretaceous is abundantly represented both by ammonites and belemnites. Again, there is a great difference between the state of preservation of a collection made from the Drift, and that of one which can be made now from the Speeton Clay *in situ*. Hence, the existence of a wide spread of these clays to the east is confirmed. The chalk belemnites belong to a zone higher than any known in Yorkshire; therefore, they probably came from the sea-bed.

MANCHESTER MICROSCOPISTS.

The Manchester Microscopical Society is well known for the unusually good work it accomplishes in the way of giving popular lectures on microscopical and natural history subjects. It also produces a valuable record of the work of its members

in its Annual Report, the last of which is before us. It contains Professor F. E. Weiss's Presidential Address on 'The Microscopical Study of Fossil Plants.' Mr. J. E. Lord describes and figures a new rotiferon, *Stephanops microdactylus*, from sphagnum moss; and gives a note on *S. stylatus*, and 'The Histology of a cycad leaf.' Mr. L. W. Waechter writes on 'Seed Plants;' Mr. A. Flatters on *Ceratium hirundinella*; Mr. W. Harvey on some common forms of Pond Life; Dr. Tattersall on Plankton; and Messrs. R. Pettigrew and A. Newton deal with cleaning and preparing specimens for the microscope. There is also a report of the Society's rambles.

LIVERPOOL GEOLOGISTS.

The Proceedings of the Liverpool Geological Society (Part III., Vol. XI.), contain two papers dealing with districts far away from the field of operations of the Liverpool Society, yet they have an important bearing upon the geology of Lancashire and Cheshire. One is on 'Present Trias Conditions in Australia.' by the Rev. C. E. Spicer, and the other is by Prof. Sir Thomas Holland, and refers to 'The Origin of Desert Salt Deposits.' They form valuable contributions to our knowledge of the origin of the Trias. Dr. A. Wade writes on 'Glacial Lakes and the Welsh Border Rivers,' and Mr. T. A. Jones gives some useful 'Petrographical Studies of Local Erratics.' There is also Mr. W. Hewitt's Presidential address, which principally refers to 'The Coast in its Geological Relations.' The *Proceedings* are illustrated by Plates, etc., and are edited by Mr. J. H. Milton.

LIVERPOOL BIOLOGISTS.

The Liverpool Biological Society has issued Volume XXVI. of its *Proceedings*. It is a magnificent publication, and contains nearly 400 pages and many excellent plates and illustrations. Among the contents are 'Reptile Life in Captivity' (the presidential address of Mr. J. H. O'Connell); the 25th Annual Report of the Liverpool Marine Biology Committee; Prof. Herdman's Report on the Investigations at the Laboratory at the Liverpool University, and the fish-hatchery at Piel; Dr. Bassett's Report on Hydrographic Work in the Irish Sea; papers on the various diseases of fishes, and a remarkable Memoir on *Buccinum* (The Whelk) by Dr. W. J. Dakin, which occupies over 100 pages. The Liverpool Biological Society certainly take the lead in the quantity and quality of its work, and in the way in which that work is published.

THE LIFE OF A SPIDER.*

Under the above heading, a remarkable collection of essays is translated from Fabre's *Souvenirs entomologiques*, and

*By J. H. Fabre. London: Hodder & Stoughton. pp. xxxix. + 378. 6s. net.

now appears in English for the first time. The translator, Alexander Teixeira de Mattos, has surely rendered Fabre's prose with the beauty and charm of the original, and the book possesses all the fascination and interest of the most romantic novel, yet is true withal; and there is not a sentence, hardly a single word, but anyone can understand it. The various phases of the lives of numerous forms of spiders are described in such a way that one wonders—cannot help wondering—why all these extraordinary stories were not available to English readers before. And the Preface, by Maurice Maeterlinck, is a masterpiece. We have never read a finer account of the smaller forms of life.

PITY THE BIBLIOGRAPHER !

That indefatigable writer and artist and printer, Mr. S. L. Mosley, is producing *The New Nature Study* at sixpence a part, of which the first five are before us. We will admit that from a bibliographer's point of view Mr. Mosley has puzzled us. To take part V. which is described as '167 from the beginning;' this number must refer to some previous publication with which Mr. Mosley has been connected. There have certainly not been 167 parts of a publication called *Nature Study*. Inside is a coloured plate of beetles, headed 'Nature Study, Vol. XV. pl. 2.' There have not been XV. volumes of any such publication. Next follows two pages on 'Insects,' the first not numbered, the second numbered '4,' and from the contents we learn that these are pages 3-4 of Vol. XV. Then follow four pages, dated Feb., 1913, and numbered 11 to 14, dealing with geology, and 'autobiography,' with an account of Mr. Mosley's family, their names, etc. From the contents we learn that pages 11 and 12 form part of Vol. XVI., while pp. 13-14 form part of Vol. XX. Next follow two pages dealing with sand, the first of which is not numbered, but is headed 'Vol. XXIII,' and the second is numbered 2. The next page is also blank, followed by another page 2. These two pages are headed Vol. XXIV., and are entitled 'A Handbook on Eight-legged Animals,' on the blank page, but '8-legged' merely, on the list of contents. Facing this third non-numbered page is a plate, numbered Vol. XXIV, pl. 1.!! We then have a fourth non-numbered page headed Vol. XXV., and entitled 'A Handbook on Geography'; the 'Handbook' extends to two pages, and refers to 'Abyssenia' (*sic*). There is still another blank page, followed by still another page 2, which is headed Vol. XXII., and is 'A Handbook on Legless Invertebrates.' This 'Handbook' refers to 'The Pisan Snail.'

—: o :—

The death is announced of Adam Sedgwick, F.R.S., Professor of Zoology at the Imperial College of Science and Technology.

MALAXIS PALUDOSA L. IN CHESHIRE.

ARTHUR BENNETT,
Croydon.

IN the 'Flora of Cheshire' (1899) p. 304, there is a note that 'The late Mr. W. Wilson has entered "Cheshire" opposite to this plant in his copy of Watson's "Outlines,"* now belonging to Mr. B. D. Jackson. It is most likely he was mistaken in the boundary of our county, and gathered it on Yorkshire ground.'

But there is no doubt he knew where it had been found as shown by Mr. Cash's interesting account of Mr. Wilson.† 'In July, 1831, he visited a place called Sinks Moss, near Knutsford, in order to gather *Malaxis paludosa*, but returned home unsuccessful. The place was partly enclosed and cultivated.' This extract answers the query.

—: o :—

South African Geology, by Prof. E. H. L. Schwarz. London: Blackie & Son, 200 pp. 3s. 6d. net.—Professor Schwarz's work on the geology of South Africa is well known, and we are glad that he has brought together a concise summary of the main geological features of that interesting area. From both scientific and economical points of view a keen interest is being taken in the geology of our flourishing colony, consequently there will no doubt be a good demand for this book. It is well arranged, well written, and well illustrated.

Cryst. Ilography and Practical Crystal Measurement, by A. E. H. Tutton, D.Sc., M.A., F.R.S., etc., pp. xiv. + 946 (London: Macmillan & Co., Ltd., 1911. Price 30s. net). So great are the strides that have been taken by the science of crystallography during recent years that such a book as the present has become a crying necessity. The setting-forth of the latest discoveries in this science could not have been placed in more capable hands than those of Dr. Tutton, whose brilliant researches in a field of work he has made peculiarly his own are of world-wide fame. In addition to being a clear exposition of the theoretical portion of the subject, most of which can be read with interest and profit by the layman, the book is essentially practical, enabling the student by its aid to carry out for himself the examination of crystals and their forms. It is difficult to say to whom the book will be of greatest service—to the chemist, physicist, or mineralogist—but it can safely be said that it is essential to each. The book is well arranged and contains 720 illustrations, and is got up in the thorough manner characteristic of the text-books issued by Messrs. Macmillan & Co. Some books on crystallography are forbidding, but this work is not so. The author is obviously enthusiastic over his subject, and the book has thereby that appealing human interest that is as essential to the success of scientific memoirs as to works of a lighter nature. With the author we believe that there *is* a great future before this subject, we feel confident that the book *will* 'help forward the progress of crystallography,' and we trust as a result of his labours there *may be* attracted to this important subject 'an increasing number of earnest spirits seeking for a field of fascinating and richly rewarding research.'—B.A.

* Outlines of the Geographical Distribution of British Plants. 1832.

† *The Naturalist*, 202-212. 1884.

ON GATHERING, GROWING AND PREPARING MOSSES FOR THE HERBARIUM.

ALBERT WILSON,
Garstang.

EVERY bryologist who has done much field work will have his own ideas as to the best way to proceed in collecting, drying, and storing his specimens. I venture, however, to make a few remarks on methods which I have found satisfactory in my own experience.

Dealing first with the work in the field—as a holder for the plants I have found nothing better than an ordinary mat bag. It is light in weight, easy to carry, and very handy for slipping the specimens in. A few small tin boxes are also useful for storing small or delicate species. As each plant is gathered I wrap it in paper and place with it a slip giving the locality, habitat, or other details, and the altitude where necessary. Ordinary newspaper is admirably adapted for the purpose, and the blank edges cut into strips about three inches by one inch serve for slips. This wrapping and labelling may seem troublesome at the time, but it not only prevents the specimens from being broken up or injured, but it is a great convenience and saving of time afterwards, as the slips of paper giving the locality, etc., can be placed along with their respective specimens during the drying process, and they are ready as references when the plants are transferred to their envelopes. In excursions extending to several days the wrapping and labelling is absolutely necessary, as it is quite impossible to remember the exact localities where large numbers—say hundreds—of specimens are gathered. If the plants can be examined or placed in the drying paper without much delay they need no special treatment, but if they cannot be dealt with for say five or six days or longer, and one is moving about from place to place, it is desirable each evening to open the packets and expose the contents to the air, so that they may dry during the night, otherwise they may be injured by mould. A better way still is to send them home by post, and arrange for them to be opened and spread out to dry in some place where they will not be disturbed, care being of course taken that the labels are not removed from the packets. They can then be dealt with in batches of convenient size as time permits. It is only necessary to damp them to bring them back to their original form, and this is best accomplished by placing the opened paper packets on a large dish in layers, one on top of the other, with a liberal sprinkling of water on each, and then placing an inverted dish on the top and allowing them to remain for about twenty-four hours.

In order to produce nice herbarium specimens it is necessary to take pains with the pressing and drying. I use ordinary absorbent paper, such as is used for flowering plants, placed between two stout boards, the pressure being obtained in the usual way by a strap. A moderate amount of pressure only should be applied, and the papers should be changed each day, one lot of papers being dried while the others are in use. A plentiful supply of paper is always a great advantage. When drying a number of specimens of the same species from the same locality, if the plants be small, it is a good plan to place them together on a piece of newspaper and lay this on the absorbent paper. Then when changing the latter the mosses can be lifted off in one operation, which is better than moving every tuft separately, and there is much less fear of breaking up or spoiling the specimens. All large thick tufts should be cut up into sections of suitable thickness, either by a knife or a pair of scissors. The best results are obtained by cutting the soil and rootlets at the base of the tuft, from below upwards, with a knife, and then tearing the sections apart, being careful to make them fairly uniform in thickness and to retain as far as possible the whole outline of the tuft. Species of *Sphagnum* and some pleurocarpous mosses, such as the harpidioid Hypna, should not be pressed in too thick masses, but should be in thin layers, so as to exhibit the branching of the stems, etc. In most cases, however, the natural tufts should not be disturbed more than necessary, but this does not prevent the exercise of taste and careful arrangement in the way the plants are spread out on the drying paper, the object being to show the natural habit of the species, and at the same time to make as pleasing a specimen as possible.

In cases where small mosses, such as some species of *Pottia*, etc., are found growing on earth which is likely to crumble into dust on drying and so break up the specimen, it is well to apply a preparation of isinglass and spirit of wine, such as is used in making adhesive plaster, to the attached soil. This composition, which is recommended by Leighton for use in preserving lichens, is first liquified in a vessel plunged into hot water and then carefully applied to the soil by means of a camel's-hair brush. It is readily absorbed, and on cooling the isinglass solidifies and effectually binds the earth together. Care should of course be taken not to touch the moss itself. The specimen may then be pressed and dried in the usual way.

It sometimes happens that an interesting plant is found with fruit in so young or immature a condition that it is unsuitable for properly determining the species, and also unfit for producing a good herbarium specimen. It is then well worth while to grow the plant at home until the fruit is fully developed. This is usually quite easily accomplished, either

in a greenhouse or under a bell-glass. The air of an ordinary living room is too dry for the purpose unless the moss is protected, and it is not quite safe to plant the specimen in a garden, as birds have a mischievous habit of pecking at anything that looks fresh or of a bright colour, and will probably carry away the tufts bodily. I usually spread a layer of sand about half an inch deep on the surface of a dinner plate, and plant the mosses—if possible with their natural earth undisturbed—in the sand, and use an ordinary ‘fish globe’ or propagator to cover them. They should be kept moist, but, unless they are aquatic species, not too wet, by sprinkling with water occasionally, and the bell-glass cover should be partially or wholly removed for a time each day or two, otherwise the mosses may become unhealthy and mould may injure them. I have grown some rarely-fruiting species in this way for several months with great success. *Hypnum sarmentosum*, with very young fruit, gathered by the snowdrifts above Loch Coire an Lochan on Braeriach, at 3,400 feet, in July 1910, produced fine ripe capsules a few weeks later. *Hypnum stellatum*, with similarly young fruit, from the margin of Hawes Water Tarn, Silverdale, gathered in February 1908, produced ripe fruit at home in April. A quantity of *Fossombronia caspitiformis* from Warton Crag, near Carnforth, brought home in November, yielded by Christmas fine ripe capsules. Without these the specimens were almost valueless, as in *Fossombronia* spores are necessary to properly determine the species. I have found the small annual winter fruiting species, as *Pottia*, etc., especially easy to grow.

I should like to urge and emphasize the duty which every bryologist owes to the British flora in trying to protect and preserve it. If only a small quantity of a rare moss be found—say a single tuft—it is often desirable to mark the spot, and make a careful search in the neighbourhood for more, before any specimen is gathered. If no more be discovered, a very small fragment only should be taken, sufficient just to serve as a voucher, the remainder being left to grow and increase.

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Among the recent additions to the **Warrington Museum** are ‘pearls from six species of freshwater mollusca in Lancashire.’

The **Leicester Museum** was recently reopened by the Right Hon. John Burns, ‘after a somewhat lengthy period of chaos due to reconstruction and enlargement.’ Mr. Burns appealed for funds for the acquisition of three adjoining houses as a branch museum of local antiquities.

The **Report of the Manchester Museum** (Publication No. 73, 46 pp., 6d.) contains a list of the additions made during the year and a record of the work accomplished in the various departments. A particularly valuable addition is the Churchill collection of foreign coins, the Dresser collection of Palæarctic birds’ eggs, etc.

ON THE ORIGIN OF THE ARANEIDAL FAUNA OF YORKSHIRE.

WM. FALCONER,
Slaitthwaite, Huddersfield.

(Continued from page 114).

It is now generally recognised that there is a close connection between the geological formation of a district (in its varied characteristics of soil, elevation, aspect and humidity), and its vegetation. The latter in its turn influences the insect life, which is the main source of the food supply of spiders. It is certain, therefore, that one of them cannot be affected without disturbing the others. This is only in accordance with what has frequently been observed, the various forms of life, both animal and vegetable, even those the most dissimilar, being apparently in some way dependent on each other. Darwin's illustration of the connection between old maids and their cats and the fertilisation of clover discloses some unexpected relations, while the introduction of goats into St. Helena caused in the course of 220 years the total destruction of the woods there and led, by the consequent loss of food and shelter, to the extinction of several small animals, birds, molluscs and a multitude of insects ('Voyage of the Beagle,' Chapter XXI.). In other places, cattle, by wholly preventing the growth of trees, have excluded from extensive districts not only the small animals of every description which subsist on roots, leaves, fruits or seeds, and the insects which are dependent on trees, but also the birds and other creatures which prey upon insects. Field naturalists are often puzzled to account for the fact that a species may be abundant in one district and yet absent from, or very rare in a neighbouring one, where to every appearance the same conditions obtain, and are driven to conclude that some slight difference of climate, food, number of enemies, etc., which they cannot discern, is the determining cause. Other instances might be adduced but sufficient has been said to show that any modification which tends to increase, diminish or exterminate one element is merely the beginning of a series of far-reaching consequences which affect favourably or adversely all the other organisms in contact, thus introducing a factor which so disturbs all existing arrangements that centuries must elapse before the balance can be restored.*

In every area at the present day there is, as a result of this cumulative and combined effect of all the influences of every kind and degree brought to bear upon organisms in the past, a general intermingling of types. As regards spiders they have

* Dr. Wallace, 'The Geographical Distribution of Animals.'

been arranged in five faunistic groups, according to the direction from which, as the circumstances of their present range indicate, they have severally diffused, but it should be borne in mind that, from the difference of geographical position and the intervention of organic and physical barriers, the conclusions proper to one area will not necessarily apply in their entirety to another. Also there are species which from our defective knowledge of them, or the peculiarity of their present distribution cannot be safely assigned to any one group.

All the sections are more or less numerically represented in the Yorkshire fauna.

NORTHERN GROUP.—A considerable portion of the County's spiders, most of which are abundant, at least in its hilly western portion, belong to this section, *e.g.*, *Coelotes atropos* Walck, *Bolyphantes alticeps* Sund., *B. luteolus* Bl., *Leptyphantes ericeus* Bl., *Pocilloneta globosa* Wid., *Hilaira excisa* and *uncata* Camb., *Macrargus rufus* Wid., *Phaulothrix hardii* Bl., *Mengea scopigera* Grube, *Centromerus arcanus* Camb. *C. prudens* Camb., *Microneta gulosa* L. Koch., *Erigone arctica* White, *Caledonia evansii* Camb., and others. They are much commoner in Scotland and in the North of England, but are altogether absent or very rare in the south of this island. Many reappear again on the Continent and penetrate in some instances a considerable distance to the south. The reason why they have not successfully colonised the south of England is not understood, but it is possible that the more highly cultivated state of the land and the drier conditions which there prevail (the ground moisture depending not so much on the rainfall as on the permeability or otherwise of the geological formations) and the consequent restricted area of wild tracts which yield the moist habitats in which they thrive best, together with their inability to maintain their ground against other species more tolerant of crowding and competition, but less hardy of constitution, may have had something to do with it. This explanation is in some measure supported by the fact that many of them when occurring in the south of England and on the continent are found on the higher uncultivated levels. As to the genesis of the northern species there is room for difference of opinion, but whether they are believed to have participated along with other organisms in the migrations southward and then northward, consequent on the gradual approach and departure of the Ice Age, or as there is more reason to believe seeing that such a theory explains more satisfactorily not only the present disposition of the faunistic groups, but also the sameness of the genera and frequently even of species in the colder regions of both hemispheres, that they radiated from a common centre somewhere in the north at a period subsequent to the Glacial Epoch, they are probably the oldest members of the araneidal

fauna of the county, for besides being constitutionally the best fitted to endure more rigorous climatic conditions, the arrangement and continuity of the mountain ranges in Scotland and the North of England would be favourable to their rapid extension, even at a time when the lower lying land would be impassable to species advancing from other directions.

WESTERN GROUP.—The next group to enter Yorkshire embraced those species which spread into it from a westerly point of the compass, for if the land connection between Ireland and Gt. Britain, while co-existent for a time with, was, as some geologists suppose, anterior both in point of elevation and submergence to that between S. E. England and the Continent, thus affording earlier access from the west, and if, as palæontology indicates, a warmer climate prevailed then as now in the western portions of Britain than in the eastern, then the former would most likely be sooner in a condition to support an araneidal population than the latter. The western species would slowly diffuse as the physical conditions improved sufficiently to permit it, but their progress would no doubt be hampered not only by the change of temperature incidental to passing from a more insular to a more continental climate but also by less tangible but not the less effective obstacles, for at a later period they would find themselves in contact with other species, much more vigorous, much more tolerant of crowding and competition, not exactly cold fearers or particular as to habitat and moreover favoured by improving climatical conditions as they spread towards the more insular areas. As a result of the ensuing competition, either all the Western species did not reach the Continent, or the severance of the land connection left their advance guard in such disadvantageous circumstances that they have either been wholly or partially displaced there, only now occurring in some of its western countries and very rarely indeed extending farther east. They have however maintained their ground in the British Isles and in some parts of them are common. The following rarer members of our fauna are probably referable to this group; *Onesinda minutissima* Camb., *Halorates reprobis* Camb., *Bathyphantes setiger* F.O.P. Cb., *Syedra innotabilis* Camb., *Gongylidiellum paganum* Sim., *Lophocarenum mengii* Sim., *Diplocephalus protuberans* Camb., *Entelecara thorellii* Westr., *Baryphyma pratensis* Bl., *Oxyptila flexa* Camb. More unmistakable and commoner members are *Oonops pulcher* Templ., *Amaurobius similis* Bl., *Hahnina montana* Bl., *Leptyphantes blackwallii* Kulcz., *Erigone promiscua* Camb., etc.

EASTERN OR CONTINENTAL GROUP.—The spiders belonging to this section entered our area from the south-east and they are those dominant and vigorous species which were referred to when dealing with the western section. They are the most

widely distributed and abundant forms not only in all parts of Britain, but also over wide stretches of land both in the Palæarctic Regions of the Old World and very often of the Nearctic Regions of the New World as well. As examples of this group it will be sufficient to mention *Tegenaria derhamii* Scop., *Phyllonethis lineata* Clerck., *Stemonyphantes lineata* Linn., *Linyphia clathrata* Sund., *Leptyphantes leprosus* Ohl., *Bathyphantes concolor* Wid., *Erigone dentipalpis* Wid., *Xysticus cristatus* Clerck., *Philodromus auricolus* Clerck., *Tetragnatha extensa* Linn., *Pachygnatha degeerii* Sund., *Meta segmentata* Clerck., *Zilla x-notata* Clerck., *Epeira diademata* Clerck., *Pirata piraticus* Clerck., *Lycosa amentata* Clerck.

Of one well known member of the group, *Pisaura mirabilis* Clerck., only two examples, both females, have so far been met with in the county. It has, however, a similar restricted distribution in some other localities.

SOUTHERN GROUP.—The spiders comprised in this division are common across the centre and south of Europe and in the south of England. The comparatively few species which reach the county such as *Prosthesima latreillei* C.L. Koch., *Amaurobius ferox* Walck., *Episinus truncatus* Walck., *Theridion vittatum* Koch., *Erigone graminicola* Sund., *Enidia cornuta* Bl., *Entelecara acuminata* Wid., *Xysticus Kochii* Thor., and *sabulosus* Hahn., *Oxyptila praticola* C. L. Koch., *Philodromus dispar* Walck., *Micrommata virescens* Clerck., *Pirata hygrophilus* Thor., *Heliophanus flavipes* C. L. Koch appear in greatly diminished numbers, and do not penetrate much farther north.

Their history may be said to date back at least to the Miocene Period, so that they are older geographically than the Northern species. The temperature of the N. Hemisphere was then much higher or more equable than at present and plants and animals belonging to warmer climates flourished within a short distance of the N. Pole. The gradually but surely increasing cold which succeeded this period, culminating in the Glacial Epoch, forced the various organisms southwards, the southern species now so called finally becoming located in regions beyond the regions of glaciation. The return of a more genial climate and the disappearance of the ice-covering would lead to a movement being inaugurated to reoccupy the newly exposed surface as soon as it became habitable, so that members of the group would be amongst the earliest to enter some parts of Britain; but in all probability not Yorkshire, as their northward advance would be greatly retarded by their incapacity to withstand the decreasing temperature and the competition of others more fitted to endure the severer physical conditions of land just emerging from its ice-covering.

SOUTH WESTERN OR LUSITANIAN GROUP.—The fauna of the county naturally from its geographical position contains

exceedingly few of this section, the headquarters of which are the S.W. of Europe and the Mediterranean shores. Typical examples are *Scotina celans* Bl. taken near Huddersfield, *Cnephalocotes curtus* Sim., and *Dysdera crocata* C. L. Koch., observed at a few places on the coast (the last also, an adult female, in the W. Riding). They are probably the county's most recent faunistic immigrants.

In connection with the distribution of the various types, it is worthy of notice that some of the rarer kinds, mainly of a northern type, viz., *Onesinda minutissima* Camb., *Centromerus arcanus* Camb., *C. prudens* Camb., *Microneta gulosa* L. Koch., *Lophocarenum mengii* Sim., *Caledonia evansii* Camb., *Cornicularia vigilax* Bl., which elsewhere in the county occur only in the S.W. or very rarely in the W., are found also but in much less quantity in the Cleveland district in the N.E., being absent from the intervening areas.

A striking feature of the Yorkshire list is the number of unexpected species which up to the present have been met with in the county. Their presence so far beyond their previously known limits presents problems of animal distribution, a satisfactory solution of which is rendered all the more difficult by the paucity of recorded observations, the result of the scanty attention which has hitherto been given to them.

Instances have already been given of the dissemination of spiders by aerial flight on a large scale, but in the more restricted area of our own land, the same kind of dispersal periodically happens, although many fewer individuals take part in it. The most unobservant must have noticed the little black spiders which alight so often on their persons at certain times of the year, and on six occasions in the Colne Valley I have witnessed concurrent displays of the same character in which several different species participated.* One result of this power of flight should be the wide dispersal of the species which make use of it. This is really the case, for those oftenest detected in the act are all very common and widely distributed forms.

With regard to four Yorkshire spiders which were new to Britain, *Notioscopus sarcinatus* Camb., *Hypselistes florens* Camb. in the North Riding, *Erigone spinosa* Camb. and *Cornicularia kochii* Camb. in the East Riding (the last also in the North Riding and the Dee Estuary), species which do not in themselves exclusively favour a maritime situation, their occurrence on or near arms of the sea, on each of which stands a great port, seems to indicate that we owe their presence with us in some way to the operations of commerce, though it is possible that the first-named may have, from its now ascertained wider distribution in Cleveland, more claim to be considered

* Vide *The Naturalist*, Feb. 1912, p. 52, and Jan. 1913, p. 83.

indigenous than the others, yet on the other hand it may have been there long enough to permit of its increase and dispersal in favourable surroundings in what is after all a limited area.

When the products are transported over greater or shorter distances by land the same transference of spiders or their eggs probably also happens, but owing to their highly developed instinct of concealment, their small size and the lack of interested and intelligent observers, the event passes unnoticed. In this connection trees transplanted from one part of the country to another for the purposes of afforestation constitute a likely medium for the introduction of new species into the latter. Dr. Jackson, in his 'Spiders of the Tyne Valley,' p. 602, expresses an opinion that the south British species, *Tegenaria atrica* C. L. Koch. was certainly introduced by man into the Botanic gardens, Southport, whence it has spread into other parts of the surrounding district. An adult female of the same species recently (Nov. 1911) travelled unharmed in a crack of a poplar tree from Montgomeryshire to a Huddersfield timber yard. An instance of a similar character is given by Dr. de Lessert in his 'Notes sur la Repartition Geographique des Araignées en Suisse' (1909), p. 487, the introduction into a Swiss tannery of *Tegenaria parietina* Fourcroy, along with oak bark received from the South of France. Occasionally spiders are carried into more unusual places, but generally the manner of their conveyance there is self-evident. *Porrhomma microphthalmum* Camb. has been met with in some quantity down a coal mine in county Durham, the vehicle in this case being fodder for the ponies. A dry barn in the Colne Valley has yielded several examples of typical hygrophiles. *Antistea elegans* C. L. Koch., *Hilaira excisa* Camb. and *Lophomma punctatum* Bl., all housed with hay from wet fields during previous years. At Redcar, in August, 1909, *Tapinocyba subitanea* Camb., usually a cellar and stable dweller, was noted in abundance on the coast close to the spot where the rubbish from the tradesmen's cellars is carted to be burnt.

Man's activities in other directions, however, are as a rule exercised at the expense of the lower creation, their favourite haunts being sacrificed to the needs of his improvements. The practice which is prevalent every spring in many parts of S. W. Yorks of setting fire to the vegetation of long stretches of rough land in high pastures and on moors ('tatching' as it is called), together with the accidental or intentional firing of the heather must annually cause great destruction of small creatures and their eggs. So also must the construction of large reservoirs and the bringing of land under cultivation, either by clearing away woodland, draining fens, mosses, etc., or by reclaiming waste and moorland—as much by restricting the area wherein they can thrive, as by the actual

elimination of species and individuals. Works of the first-named description have in the Wessenden Valley removed the habitat of *Tigellinus furcillatus* Menge, and in the Chew Valley (S. W. Yorks), that of *Hillhousia misera* Camb., with the result that neither of these rare species have been seen since in these localities though fortunately both subsequently turned up in other parts of the county, so that we have not to deplore their total loss.

Hens, which are now so extensively kept, very often with a free run in those places most likely to be frequented by spiders, make a wonderful clearance of all the minute forms of life. In the little cloughs amongst the hills given over to poultry, spiders can only be met with in places inaccessible to the hens, such as tangled masses of ground-growing thorns and brambles, vertical banks, beneath stones, etc., but in neighbouring cloughs of precisely the same description where none is kept there is no such restriction, the spiders being more generally distributed.

So great indeed has been the effect of man's long continued and unceasing labour that in course of time he has, in one way or another, more or less completely altered the surface aspect of this country, and in doing so, must, as I have endeavoured to show, have affected the composition of its fauna (inclusive of spiders) to an incalculable extent. Depending on this circumstance alone, there is nothing inherently untenable in the proposition that, in the original undisturbed condition of the country, the southern species may have been able to make greater headway than is indicated by their present range, that some have more or less successfully adapted themselves to the changing environment and are maintaining their ground, while others have failed to do so and been driven back towards their old territory, so that such species as *Diæa dorsata* Fabr., (now lost to Yorkshire), *Micrommata virescens* Clerck, *Cercidia prominens* Westr. and *Crustulina guttata* Wid., which have occurred in places, very little if any changed from their primeval state (situations which negative the idea of their accidental introduction), may be lingering survivals of such an extension rather than species which have succeeded in penetrating farther north than their compeers.

The other unexpected forms, *Clubiona subtilis* L. Koch., *Protadia subnigra* Camb., *Linyphia impigra* Camb., *Hycia nivoyi* Luc., *Euophrys æquipēs* Camb. in the East Riding; *Syedra pholcommoides* Camb., *Coryphæus simplex* F. O. P. Cb., *Trochosa robusta* Sim. in the North Riding; *Coelotes terrestris* Wid., in the North and West Ridings; *Clubiona facilis* Camb. in the West Riding, give no more hint of the method of their advent into the county than can be gathered from the fact that, with one exception, they were found on the

coast. Nothing beyond this could be expected as the whole subject of the geographical distribution of spiders and other small creatures is, in the present imperfect state of our knowledge, involved in obscurity and will remain so until the principles which underlie the intimate and complex relationships between the various factors (organic, physical, climatical, geological, ecological, commercial, etc.), which govern or have governed that distribution, are more fully understood and appreciated. The first step towards the attainment of this information is the accumulation of observations and other data, each perhaps of little value by itself, but, when brought into due relationship with others, pregnant with meaning to the mind of a Newton, Darwin or Wallace.

The Journal of the East Africa and Uganda Natural History Society. Vol. III., No. 5, contains illustrated papers on Mombasa Sea-fish, the Thowa River, Prehistoric Man, Big Game, East African Snakes, Plants and Trees, and Methods of Preserving Various Natural History Specimens. There are 66 pages, and the price is 5s. 4d. (Longmans, Green & Co.).

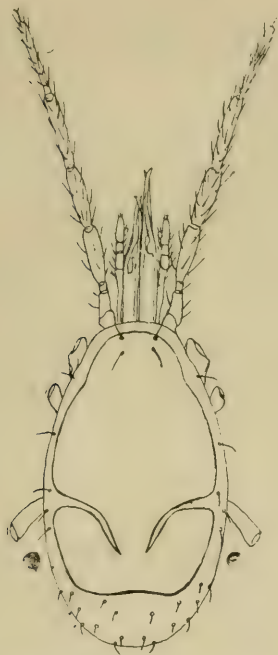
Who's Who in Science International, 1913, edited by H. H. Stephenson. London: J. and A. Churchill, pp. xvi. + 579, 8s. net. On the lines of the familiar Who's Who, the present publication contains biographical notices of several thousand scientific men in various parts of the world. It is a wonderful compilation, and will be useful in many ways. The volume contains particulars of the world's Universities, Scientific Societies, etc. There is an index of names under subjects in which the people are interested, though it is not apparent upon what principle this has been prepared, as some names which are given in the biographical list do not appear. In the list of societies are many omissions, which a reference to the list of corresponding societies in the British Association Report would have prevented. In Yorkshire alone, the names of important societies at Bradford, Leeds, Halifax, Hull, Huddersfield, Doncaster, Scarborough, etc., are not given.

The Dictionary of Entomology, by Nigel K. Jardine, F.E.S. Published at Ashford, Kent. London Agents, West, Newman & Co., 54, Hatton Garden, E.C. Price 6/- net. This book will supply a distinct want. It is an attempt to give the meanings, as well as the derivations, of all the technical words and terms used in entomological literature in all its branches; and in our opinion, a very successful attempt. We have tested it with various technical terms, taken at random as they came to our mind, and even with words seldom used, yet have found none of them missing. The terms are treated in alphabetical order (some three thousand of them), the meaning, followed by the derivation, being given in each case. Now and again we might take exception to the given derivation of a word, but such instances are very rare, as are also the cases of mis-spelling. Here and there, too, words and meanings are unnecessarily duplicated, as 'maculate' on p. 120, but these minor errors will not detract from the usefulness of a book which will often save much time and trouble not only to those commencing entomology as a scientific pursuit, but even to advanced students, who are constantly coming across technical terms little used, or perhaps, as is often the case, not used at all in the special branch of the science in which they are interested, and the meaning of which at the moment, they cannot remember; or very possibly terms they may never before have even seen. The book is clearly and well-printed, but so far as we can discover, is absolutely without date, an omission which in these days has rightly become inexcusable.—G.T.P.

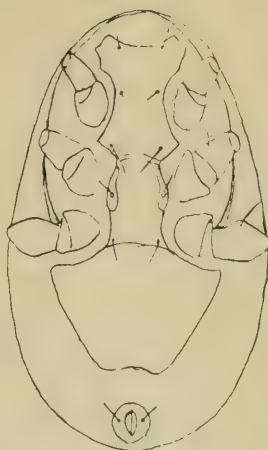
GAMASUS IGNOTUS N.SP. IN LINCOLNSHIRE.

C. F. GEORGE, M.R.C.S.

AMONG the Acari the *Gamasea* are perhaps more often met with than any other species of mite. They are parasitic in one or other stage of their existence, and are then frequently found in great numbers and in very curious places. They are, however, often found free and very active, especially



Gamasus ignotus n.sp., dorsal view
× 36. Length of body 1.12 mm.



Gamasus ignotus n.sp., ventral view. × 50.

in moss and under damp leaves, stones, etc. Though they shun the light they have no visible eyes. Their front legs are commonly the longest and thinnest, and are used as feelers. The body is encased in plates of chitin of different shapes and sizes, with thinner skin between them, and these chitinous plates assist us in the determination of species. There are usually two dorsal shields (anterior and posterior), divided by a line or by a more or less narrow portion of soft skin passing transversely between them. Sometimes, however, there is but one dorsal shield, generally oval in shape, but

occasionally extending as far as the ventral plates. In *Gamasus ignotus* the dorsal shield is in one piece, ovoid in shape, but truncated at the lower edge, and has no line of division passing transversely across it. There are, however, two long open lines, widest at the outer edge, and curving downwards, and ending in a point without reaching the lower edge of the shield. If these had been continued until they met they would have divided the plate into two unequal and very irregularly-shaped portions, or if continued to the edge of the plate it would have been divided into three.

It is this curious formation which had induced me to record this specimen. To me it is quite unique, and I have not seen any figure or record of such a condition. Mr. Soar's excellent figure, which was made from the mite before it was mounted or compressed, makes this explanation quite clear. He has also figured the ventral plates, which are sometimes considered of importance in classification. The mite was taken with other mites at Canwick, near Lincoln, and sent to me in December of last year by Mr. Musham, of Selby.

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In *The Entomologist* for February, Mr. J. W. H. Harrison has an interesting paper on 'Friends and Foes of the Coniferæ.'

Richard's Pipit and the Yellow Browed Warbler in Lincolnshire, and the Brent Goose, in Derbyshire, are recorded in *British Birds* for March.

Part 26 of Cassell's *Nature Book* contains a well-illustrated article on The Bats, by Douglas English. There is also a picture of a stuffed fox with a rabbit.

Mr. H. B. Booth has a note on 'Late Stay of the Swifts,' in the *Irish Naturalist* for February; a subject which he dealt with in *The Naturalist* for 1907, pp. 111.

In *The Geological Magazine* for February, Mr. R. M. Brydone writes on 'The Proposed recognition of two stages in the English Chalk,' in which he makes many references to Yorkshire.

A report of the meeting of the Entomological Section of the Yorkshire Naturalists' Union, held at Leeds, on October 19th last, is given by Mr. G. T. Porritt in *The Entomologist's Monthly Magazine* for February.

In the *Geological Magazine* for January Dr. T. G. Halle and Prof. P.F. Kendall describe the stems and rhizomes of *Equisetites columnaris* from the Lower Estuarine Sandstone of the Peak, Yorkshire.

In a paper on 'Some cases of Plants suppressed by other plants,' by Mr. C. A. M. Lindman, of Stockholm, in *The New Phytologist* for January, reference is made to the gigantic form of *Pteridium aquilinum* at Honley, Yorkshire.

Under the head of 'Announcements,' in *Nature Study*, No. 4, we learn 'our visit to the Skipton Adult school on December 14th and 15th was a great success. The Bird Picture Post Cards were eagerly sought. The Art Master sent for a dozen. One boy, Owen Jennings, has been copying them. . . . We give prizes for such work when a member if (sic) the family is a subscriber to *Nature Study*.' . . . Another letter, from Accrington, says "There is only one S.L.M. in the world, and there will never be another."'

ALIENS AND INTRODUCED PLANTS OF THE UPPER HODDER.

M. N. PEEL,
Knowlmere Manor.

THE upper portion of the Hodder valley is hardly a likely place for Casuals and Weeds of Cultivation. It is a grass and moorland country, now entirely without plough-land; the only cultivated spots being the gardens, which are few and far between.

I. THOROUGHLY NATURALISED with little fear of eradication.

Trifolium hybridum. Seeds introduced about the year 1904 probably with imported hay.

Ribes grossularia. Very Common; in hedges and woods.

Ribes rubrum. Hedges and river banks.

Ægopodium Podagraria. Near buildings.

Tanacetum vulgare. Newton Village Green.

Linaria Cymbalaria. Old walls near gardens.

Mimulus luteus. In the Hodder and its tributaries. Very common.

Chenopodium Bonus-Henricus. River banks and roadsides.

Polygonum Bistorta. A weed in damp meadows.

Humulus Lupulus. One colony, roadside hedge, increasing.

Epipactis violacea. Probably introduced with young trees a century ago.

2. WEEDS OF CULTIVATION. Roadsides, waste places and gardens.

Sinapis arvensis. Rubbish heaps, etc.

Sisymbrium officinale. Garden Weed, very rare.

Cardamine hirsuta. Garden weed, Knowlmere.

<i>Lychnis Githago</i> .	} In an old Pheasantry. Introduced with pheasant food presumably. 1912.
<i>Silene Cucubalus</i> .	
<i>Vicia angustifolia</i>	

Linum usitatissimum. In a pasture where pheasants had been reared the previous year.

Matricaria Parthenium. Rubbish heaps and roadsides. Rare.

M. Chamomilla? Roadside. One plant. 1911.

Senecio sylvaticus var. *auriculatus*. In the above-named old Pheasantry. Numerous, 1912. Auricles of upper leaves expansive at their insertion in stem.

Sonchus asper. A form with rounded auricles, flat, reddish or dull green lobed leaves with short teeth, occurs as a garden weed. The apparently truly wild plant of Upper Hodder has rounded auricles, and waved shining green lobed leaves with spiny teeth.

<i>Convolvulus sepium.</i>	Flowers white.	A garden weed.
<i>Solanum nigrum.</i>	Not common,	" "
<i>Veronica agrestis</i>		" "
<i>V. polita</i>		" "
<i>V. Buxbaumii.</i>		" "
<i>Atriplex angustifolium.</i>		" "
<i>A. hastata.</i>		" "
<i>Euphorbia Helioscopia.</i>		" "
<i>E. Peplus.</i>		" "
<i>Avena fatua.</i>	Once only.	" "

3. GARDEN ESCAPES. Probably originally cultivated.

- Aquilegia vulgaris.* Hedgebank, near a garden.
Berberis vulgaris. Possibly native.
Chelidonium majus. Near an old garden.
Brassica oleracea. Garden cabbage 'gone wild.' In the above-mentioned old Pheasantry. Two plants.
Hesperis matronalis. Occasional.
Armoracia rusticana. Near buildings.
Viola cornuta. 302 Oxford List. Hedge-bank, 1912.
 [The Pyrenean garden bloom.—F.A.L.]
Ribes nigrum. River bank.
Sempervivum tectorum. On old buildings. Frequent; not 'escaped' in a real sense, but hand-planted and forgotten.
Saxifraga Geum. One locality only some distance from a garden.
Chaerophyllum sativum. Planted at Knowlmore more than thirty years ago; still appearing as a garden weed.
Pucedanum Ostruthium. Surviving as a weed in an old garden.
 [Used to be grown for use in cattle pharmacy].
Polemonium coeruleum. River banks; sometimes blue, but usually white.
Mentha viridis. Garden mint. In a hedge bank.
Lysimachia vulgaris? River bank; a wash-down from Knowlmore. Corolla glabrous.
Galanthus nivalis. Originally planted.

4. CASUALS introduced into a rough pasture near Newton with a 'top-dressing' of 'Black Wheat Dust.'

The pasture in question being very 'benty' and poor, during the 'back-end' of 1911 the farmer applied a dressing of 3 or 4 sacks of 'wheat dust,' i.e., the screenings of wheat obtained from corn-millers, in order to induce the cattle to eat up the coarse grass. The desired result was obtained, the 'bents' being eaten down to the roots, in the patches where the 'dust' was thickly applied. During the summer of 1912 the aliens given below appeared. Dried specimens of all (with the exception of *Sinapis arvensis*, *Centaurea Cyanus*

and *Sisymbrium officinale*) were examined and named by Mr. F. A. Lees.

Sinapis arvensis.

Brassica napus L. var. *Chinensis* L. Elongate inflorescence, petals deep yellow, short-clawed. In seed.

Eucastrum longirostra Boiss. A long beaked Cabbage-mustard of Eastern Europe. In seed.

Sisymbrium officinale. In seed. One plant.

Thlaspi arvense. In seed.

Lepidium campestre Br. Not previously found in Upper Hodder. In seed.

Neslia paniculata Desf. No. 258 Oxf. List. An aberrant Crucifer Pod unique in the order: One plant only.

Melilotus indica Allm. (*parviflora* Desf.). In seed.

Galium spurium var. *Vaillantii* L. (Orient.) 1203 Oxford List. In seed.

Anthemis Cotula. Numerous.

A. arvensis. Two plants only.

Centaurea Cyanus. One plant.

Lappula (*Echinosperrum*) *echinata* Gilib. No. 1787 Oxford List. Corolla small blue, limb spreading, five lobed. An echinus-spined seed.

Sideritis montana var. *elegans* Willd. The Ironwort No. 2048 Oxford List. Corolla deep yellow; calyx segments five, equal, spiny.

Galeopsis Ladanum L. The broadish, serrate-leaved form.

Polygonum convolvulus.

Triticum aestivum L.

Hordeum distichon L. (Not *hexastichon*. Specimen very imperfect.)

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From the **Bankfield Museum, Halifax**, we have received No. 1 of the Second Series of Museum Notes (33 pp., 1/-). It is a well illustrated paper on 'Oriental Steelyards and Bismars,' and is by the Honorary Curator, Mr. H. Ling Roth. The paper is reprinted from the *Journal of the Royal Anthropological Institute*, which is much larger in size than the octavo publication already issued from the Halifax Museum, and makes the question of binding these useful publications a difficult one.

The **Doncaster Museum** has issued a penny 'Catalogue of Antiquities, comprising the Stone and Bronze ages, the Roman, Saxon, Mediæval and Later Periods Section.' It contains 16 pages, enumerates over 500 specimens and has been compiled by the Curator, Mr. E. C. Senior, and the 'first edition' was issued in January. We are delighted to find this evidence of some attention being paid to the interesting collection at Doncaster, as we had rather got the impression—rightly or wrongly—that the Museum portion of Beechfield was being neglected. The catalogue is a useful publication and we should like to see it followed by a list of the geological specimens, which, in view of the developments being made in connection with coal-mining at Doncaster, should prove of exceptional value and interest.

FRESHWATER RHIZOPODA FROM THE NORTH AND WEST RIDINGS OF YORKSHIRE.

G. H. WAILES, F.L.S.

DURING 1910 many gatherings were collected and examined for Algæ and Rhizopoda in the Northern part of Yorkshire. Lists of Algæ have been published by the Yorkshire Naturalists' Union, but with the exception of Mr. Brown's list for the Sheffield District * no lists of the Yorkshire Rhizopoda are available.

The following are the principal localities from which collections were gathered:—

- (1) Husthwaite, 15 miles N. of York, numerous ponds, ditches, hedges, etc. (200-480 ft.).
 Pondhead reservoir (400 ft.).
 Newburgh Priory, lake and stream (100 feet).
 Wass, stream and woods in valley (400 feet).
 Kilburn, ponds and ditches (300 feet).
 Oldstead, woods, pond and spring (400 feet).
- (2) Pilmoor, Sphagnum bog and pools (90 feet).
 Leckby Carr, Sphagnum bog (100 feet).
 Thirsk, ponds near the town (100 feet).
 Alne, ponds in the Park of Alne Hall and in Alne Forest (150 feet).
- (3) Gormire Lake (450 feet).
 Hambleton Moor (800-900 feet).
 Wass Moor (800 feet).
 Helmsley Moor (800 feet).
 Billsdale valley and moors (800-1000 feet).
 Bransdale Moors (700-1300 feet).
 Fadmoor (500-600 feet).
 Harland Moor (750 feet).
 Rudland Moor (800-1100 feet).
 Goathland Moors (600-800 feet).
 Rievaulx Abbey woods and stream (300 feet).
- (4) Fountains Abbey, ponds and woods.
 Harrogate and Plumpton ponds.
 Staveley Dam near Knaresboro'.
- (5) Bolton Moors, above the Abbey.
 Cockett Moss (Collected by W. West).

Of the above groups—

- (1) Consists of elevated land forming the N.E. borders of the Vale of York.

* 'The Naturalist,' 1910, p. 92.

- (2) Sphagnum swamps in the Vale of York comprising undisturbed portions of the ancient moorland and a few artificial ponds.
- (3) The Moors of the Hambletonian Range of Hills.
- (4) Elevated land forming the Western boundary of the Vale of York.
- (5) Moor land in the West Riding.

No gatherings from Sphagnum are included in lists (1) and (4) except from a spring at Oldstead from which several interesting species were obtained. One pond surrounded by cultivated land, near Husthwaite appeared, judging from the Algæ found in it, to be one of the ancient moorland pools; it yielded *Cucurbitella mespiliformis* which has not been recorded from elsewhere in the British Isles.

The total number of records is 120 species and 27 varieties.

A detailed description of the genera *Euglypha* and *Cyphoderia* with identification tables will be found in the Proc. Royal Irish Acad. Vol. XXXII., Clare Island Survey, Part 65, 1911, also an illustration of the *Cyphoderia ampulla* var. *major* from Oldstead.

The record of *Cyphoderia lævis* from near Husthwaite is doubtful as only an empty test was found.

Diffugia subæqualis Penard (Revue Suisse de Zool., 1910) was found in a not quite typical form, but similar to those which occur in the Orkney and Shetland Islands and of the following dimensions:—length, 70-90 μ ; diameter, 70-85 μ ; diameter of aperture, 45-60 μ .

CLASS SARCODINA.					1	2	3	4	5
SUB-CLASS RHIZOPODA.									
ORDER AMOEBINA.									
FAMILY LOBOSA.									
<i>Amoeba gorgonia</i> Penard	×	×			
„ <i>guttula</i> Duj.	×		×		
„ <i>limax</i> Duj.	×	×	×	×	
„ <i>limicola</i> Rhumb.		×			
„ <i>proteus</i> (Pallas) Leidy		×	×		
„ var. <i>granulosa</i> , Cash.		×			
„ <i>striata</i> , Penard	×	×	×		
„ <i>verrucosa</i> , Ehrenb.		×	×		
„ <i>vespertilio</i> , Penard.	×		×	×	
„ <i>villosa</i> , Wallich	×				
<i>Dactylosphaerium radiosum</i> (Ehren.) Bütsch	×	×	×		
<i>Pelomyxa palustris</i> Greeff		×			
FAMILY RETICULOSA.					1	2	3	4	5
FAMILY VAMPYRELLIDA.									
<i>Chlamydomyxa montana</i> Ray Lan.		×			
<i>Nuclearia delicatula</i> Cienk		×			

ORDER CONCHULINA.					
FAMILY ARCELLIDA.					
	1	2	3	4	5
<i>Arcella arenaria</i> Greeff				×	
.. <i>discoides</i> Ehren		×	×	×	×
.. <i>hemispherica</i> Perty					
.. <i>polypora</i> Penard					
.. <i>vulgaris</i> Ehren	×	×		×	×
.. var. <i>compressa</i> Cash.				×	
.. var. <i>gibbosa</i> (Pen.) G. S. West		×		×	
<i>Bullinula indica</i> Penard		×			
<i>Centropyxis aculeata</i> Stein	×	×	×	×	×
.. var. <i>discoides</i> Penard		×	×	×	
.. var. <i>ecornis</i> (Ehren) Leidy		×	×		×
.. var. <i>spinosa</i> Cash		×			
.. <i>arcelloides</i> Penard		×	×		
.. <i>laevigata</i> Penard		×	×		
<i>Cochliopodium bilimbosum</i> (Auer) Leidy		×	×		
.. <i>digitatum</i> (Greeff.) Calk.		×			
<i>Cryptodiffugia eboracensis</i> Wailes					×
.. var. <i>compressa</i> Penard		×			
.. <i>oviformis</i> Penard		×			×
.. <i>sacculus</i> Penard		×			
<i>Cucurbitella mespiliformis</i> Penard	×				
<i>Diffugia acuminata</i> Ehren	×	×			
.. var. <i>curvata</i>	×				
.. var. <i>inflata</i>	×				
.. <i>arcula</i> vide <i>Trigonopyxis</i>					
.. <i>bacillifera</i> Penard		×			
.. <i>bacilliarum</i> Perty.		×			×
.. var. <i>elegans</i> (Pen.) Hopk.	×	×			×
.. var. <i>teres</i> Pen.		×			
.. <i>brevicollis</i> Cash.	×	×	×		×
.. <i>constricta</i> (Ehren.) Leidy	×	×	×	×	×
.. <i>corona</i> Wallich.	×	×	×		
.. <i>globulus</i> (Ehren.) Hopk.	×	×	×		
.. <i>gramen</i> Penard.	×			×	
.. <i>lanceolata</i> Penard.	×				
.. <i>lobostoma</i> Leidy.	×		×	×	
.. <i>lucida</i> Penard	×		×	×	
.. <i>manicata</i> Penard.	×				
.. <i>oblonga</i> Ehren	×		×	×	
.. var. <i>bryophila</i> Penard.			×		
.. var. <i>lacustris</i> (Pen.) Cash	×		×		
.. var. <i>nodosa</i> Leidy.	×		×		
.. <i>subæqualis</i> Penard.		×			
.. <i>oviformis</i> Cash	×	×	×		
.. <i>penardi</i> Hopk.	×		×		
.. <i>pristis</i> Penard.	×				
.. <i>pulex</i> Penard		×			
.. <i>rubescens</i> Penard	×	×	×		×
.. <i>tuberculata</i> (Wallich.) Archer		×			
.. var. <i>minor</i> Penard		×			
.. <i>urceolata</i> Carter	×	×			
<i>Heleopera lata</i> Cash.					
.. <i>petricola</i> Leidy.	×	×	×		×
.. var. <i>amethysea</i> Pen.		×	×		×
.. var. <i>major</i> Cash.			×		
.. <i>rosea</i> Penard.			×		×
.. <i>sordida</i> Penard	×		×	×	

	1	2	3	4	5
<i>Heleopera sphagni</i> (Leidy) Hopk.			×		
<i>sylvatica</i> Penard			×		
<i>Hyalosphenia elegans</i> Leidy.		×			
<i>inconspicua</i> G. S. West			×		
<i>papilio</i> Leidy		×	×		×
<i>subflava</i> Cash.		×	×		×
<i>Lesquerusia modesta</i> Rhumb.	×	×	×		
<i>spiralis</i> (Ehren.) Bütsch		×	×		
<i>Nebela americana</i> Tarán.			×		
<i>carinata</i> (Archer) Leidy		×	×		
<i>collaris</i> (Ehren.) Leidy	×	×	×	×	
<i>dentistoma</i> Penard	×	×	×		×
var. <i>laevis</i> Cash.			×		
<i>flabellulum</i> Leidy		×	×		
<i>galeata</i> Penard		×			
<i>lageniformis</i> Penard		×	×		
var. <i>minor</i> Wailes			×		
<i>militaris</i> Penard		×	×		
<i>parvula</i> Cash		×	×		
<i>tenella</i> Penard			×		
<i>tincta</i> (Leidy) Awer.		×	×		
<i>tubulata</i> Brown			×		
<i>tubulosa</i> Penard		×	×		
<i>vitrea</i> Penard	×	×	×		
<i>Phryganella acropodia</i> (Hert. and L. Hopk.)	×	×		×	
<i>nidulus</i> Penard	×	×	×	×	
<i>paradoxa</i> Penard	×				
<i>Plagiopyxis callida</i> Penard	×				
<i>Pontigulasia bryophila</i> Penard	×		×		
<i>compressa</i> (Carter) Cash	×	×	×		
<i>Pseudochlamys patella</i> Clap. et Lach	×	×			
<i>Pyxidicula operculata</i> Ehren.		×	×	×	×
<i>Quadrula irregularis</i> Archer	×	×	×		×
<i>symmetrica</i> (Wallich) F. E. Sch.	×	×	×	×	
var. <i>irregularis</i> Penard			×		
<i>Trigonopyxis arcuata</i> (Leidy) Pen.			×		
FAMILY EUGLYPHINA.					
<i>Assulina muscorum</i> Greeff	×	×	×	×	×
<i>seminulum</i> Leidy	×	×	×		×
var. <i>scandinavica</i> Pen.			×		
<i>Corythion dubium</i> Taránek	×	×	×	×	×
<i>pulchellum</i> Penard	×	×	×		
<i>Cyphoderia ampulla</i> (Ehren.) Leidy	×	×	×	×	
var. <i>major</i> Penard	×				
var. <i>papillata</i> Wailes		×			
var. <i>vitrea</i> Wailes	×				
<i>laevis</i> Penard	×				
<i>trochus</i> var. <i>amphoralis</i> Wailes	×	×	×		
<i>Euglypha alveolata</i> Duj.	×	×	×		
<i>armata</i> Wailes		×	×		
var. <i>brevispina</i> Pen.		×			
<i>bryophila</i> Brown	×	×			
<i>ciliata</i> Ehren.	×	×	×	×	×
<i>compressa</i> Carter		×	×		×
<i>cristata</i> Leidy		×	×		
<i>filifera</i> Penard		×	×		
<i>laevis</i> Perty	×	×	×	×	
<i>scutigera</i> Penard		×			

			1	2	3	4	5
<i>Euglypha</i>	<i>strigosa</i>	Leidy	×	×	×		×
"	<i>strigosa</i>	var. <i>heterospina</i> Pen. ..	×	×			
"		var. <i>muscorum</i> Wailes ..	×			×	
"	<i>rotunda</i>	Wailes	×	×	×		×
<i>Placocysta</i>	<i>jurassica</i>	Penard		×			
"	<i>spinosa</i>	Leidy			×		×
<i>Sphenoderia</i>	<i>dentata</i>	Penard	×	×	×		×
"	<i>fissirostris</i>	Penard		×	×		×
"	<i>lenta</i>	Schlumb.		×	×		
<i>Trinema</i>	<i>complanatum</i>	Penard	×	×	×	×	×
"	<i>enchelys</i>	Leidy	×	×	×	×	×
"	<i>lineare</i>	Penard	×	×	×	×	×
FAMILY GROMIINA.							
<i>Pamphagus</i>	<i>hyalinus</i>	Ehren.	×	×	×		×
<i>Pseudodiffugia</i>	<i>fascicularis</i>	Penard		×			
"	<i>fulva</i>	Archer		×			
"	<i>gracilis</i>	Schlumb.		×			
FAMILY AMPHISTOMINA.							
<i>Amphitrema</i>	<i>flavum</i>	(Archer) Penard		×	×		
"	<i>stenostoma</i>	Müsslin	×	×	×		×
"	<i>wrightianum</i>	Archer			×		

We regret to record the death of the Earl of Crawford, a keen naturalist, at the age of 66.

Sir William White, who was to have presided at the Birmingham meeting of the British Association, died a few days ago.

Mr. Clement Reid, F.R.S., the author of many Geological Survey Memoirs (including the 'Geology of Holderness'), and 'The Origin of the British Flora,' retired from the Survey in January.

The following is taken from a recent bookseller's catalogue :—'Sollas (I. B. J.) and Lapworthura (W. J.) A typical Britlestar of the Silurian Age. With Suggestions for a new Classification of the Ophiroidea. 4to, sd., pp. 20. *Dulau*, net 1s. 6d.'

In a paper on 'The Natural History of Coal and Coal-Dust,' in the Transactions of the Manchester Geological and Mining Society (Vol. 32, parts XX. and XXI.), Mr. James Lomax describes the specimens in the Garforth collection, which are now in the Leeds University.

In the 'Answers to Correspondents' section of a well-known Natural History column recently we notice :—'B.M.W., York.—'There should be no difficulty in identifying a thrush, but you do not seem sure. You had better write to the Registrar of the University.' He ought to know a thrush from a handsaw, anyway!

They can evidently control their feelings in Scotland. We looked somewhat anxiously to see what was contained in Mr. A. M. Rodger's 'Remarks on the Weather at Perth,' contained in the recently issued *Proceedings of the Perthshire Society of Natural Science*, but we found nothing to which even the veriest Puritan could take exception.

Mr. H. Ling Roth, formerly Honorary Curator of the Bankfield Museum, Halifax, has been offered an honorarium of £100 per annum from the Halifax Corporation as keeper of the Museums in that town. Mr. C. Crossland and Mr. W. B. Crump have resigned their positions as Honorary Curators of the Belle Vue Museum. In the *Halifax Guardian* for 30th November, Mr. Crump gives an account of his stewardship of the Belle Vue Museum during the previous fifteen years.

VERTEBRATE ZOOLOGY IN YORKSHIRE.

A. HAIGH-LUMBY.

THE Zoological Section of the Yorkshire Naturalist's Union held two meetings on Saturday the 15th February, at the Leeds Institute, at 3.15 p.m. and 6.30 p.m. The President, Mr. H. B. Booth, F.Z.S., M.B.O.U., was in the chair, and, in referring to the work of the section, expressed the hope that members would attend the excursions of the Union during the coming summer in greater numbers, and so assist in the investigation of various parts of the county. Mr. Riley Fortune detailed the arrangements made by the Wild Birds' Protection Committee for watchers during 1913.

Mr. A. Whitaker announced that the Mammals, Amphibians, Reptiles and Fishes Committee had elected referees for the different orders under investigation, to whom all enquiries, information, specimens, etc., relative to that particular order, should be sent.

Mr. W. H. Parkin reported having seen in July, 1912, a Great Black-backed Gull near Harewood Bank, which repeatedly plunged almost completely under water, evidently to secure food.

Mr. G. H. Parkin exhibited preserved specimens of the Little Gull in the first year's plumage, taken in Lincolnshire; a beautiful and most unusual variety of the Common Bunting with plumage almost like that of a Yorkshire Canary, and a fawn coloured specimen of the Chaffinch, both the latter being taken in Yorkshire.

Mr. H. B. Booth exhibited two skins of male Song Thrushes, shewing the marked variation in the local race, and what may be the Continental form; and gave Hartert's descriptions along with the new specific names.

A general feeling of dissent against the introduction and use of these new designations was expressed, and a resolution to this effect was passed.

In the unavoidable absence of the author, Mr. G. Waddington's paper on 'The Fishes of the Lower Wharfe Basin,' was read by the Secretary. The descriptions and characteristics of the 17 species therein referred to, were of particular interest to the angling fraternity present, but its value as a concise history of the fishes of a defined area of our county will be better appreciated when it is published.

Owing to a severe illness, Dr. E. S. Steward was unable to give his promised paper, 'Further Notes from Spain,' but Mr. J. Wilkinson, who recently made an ornithological trip to Iceland, was present with a series of photographs which he had taken on that occasion, and he kindly complied with the

request of the President, and gave the results of his observations on the birds of that island. His notes referred almost entirely to the south-west of the island, which he reached early in June. The wealth of the Icelandic avi-fauna during the breeding season was illustrated by accounts of the comparative abundance of species which are only known to us as winter visitors.

At the evening meeting, Mr. Greaves exhibited the skull of a recently trapped Pine Marten, possibly the last of the Yorkshire records.

Mr. R. Fortune exhibited an extraordinary set of lantern slides lent by Mr. W. Farren of Cambridge, illustrating Spanish bird-life, particularly the Little Egret, Spoonbill and Stilt.

Mr. W. J. Clarke, F.Z.S., with the help of most beautifully-coloured slides—all his own work—gave a comprehensive and instructive lecture on 'British Reptiles and Batrachians.' With one exception all the British species were represented on the screen, also several foreign examples, shewing the brilliant colouring and huge size of the more tropical forms. Speaking from first hand knowledge, the lecturer described the construction, habits, the periodic skin casting of the snakes, the various spawning methods of the Batrachians, along with a wealth of folklore and superstition connected with the lizard and toad. The interest aroused was indicated by the discussion at the conclusion of the lecture, relative to the hibernation of frogs, the 'homing' instinct of frogs at spawning time, the ability of the grass snake to take live fish in water, etc.

Mr. W. Wilson then spoke on 'Birds of the Seashore.' The species dealt with were those found on Cockerham Moss, Ravensglass Gullery, and Walney Island—where numerous fine photographs had been taken, and these were shewn on the screen, being accompanied by the lecturer's notes with reference to many of the little known traits of bird life and character, as seen from a hiding tent.

A hearty vote of thanks to the lecturers and to Mr. Graham, of the Leeds Education Authority, for the use of the room, was carried.

—: o :—

Micropetrology for Beginners.—An introduction to the use of the microscope in the examination of thin sections of igneous rocks, by J. E. W. Rhodes, with a Preface by C. H. Sidebotham. London: Longmans, Green & Co., pp. xvi. + 126. The book is especially written for the use of teachers in Elementary Schools and for students seeking Inter. B.Sc. in Geology. It is eminently practical, and gives useful hints on cutting and examining rock sections, with chapters on typical rocks such as Shap granite, Plauen syenite, etc. There is a table for the identification of rock-forming minerals, and a glossary-index.

FIELD NOTES.

BIRDS.

Bitterns in Holderness.—On the 12th January, a bittern was picked up near the Humber shore at Paull. The bird was in immature plumage and very poor in condition. On the 20th January, Mr. E. Stubbs received a fine mature example of this species. Mr. Stubbs informs me he had received three birds of this species within a fortnight, and in addition, two had been shot by a local gamekeeper. I have repeatedly noted the Bittern in this district during the month of January, but never before in such numbers as recently.—STANLEY DUNCAN, Hull.

—: o :—

HYMENOPTERA.

Willow Gall (*Euura pentandrae*) near Leeds.—On 7th December last, at Alwoodley Gates, near Leeds, I observed this gall on the willows which for upwards of twenty yards line the right-hand side of the road leading to Shadwell. The tall bushes were completely overspread by the gall, and the twigs, hardly one of which was without one example at least were in consequence strongly bent and contorted. In their leafless condition and thus heavily burdened they were very conspicuous objects. The gall is caused by one of the saw-flies. In each may be from one to six or eight larvæ, and the flies emerge in April.—WM. FALCONER, Slaithwaite, Huddersfield.

—: o :—

ARACHNIDA.

***Coryphæus simplex* F.O.P.Cb. new to Lancashire.**—At the end of July last, while collecting on the shore at Fairhaven, south of Blackpool, I took a female of this spider from beneath a tuft of *Atriplex*. It is one of the rarer British species, with as yet few recorded stations. Originally discovered, both sexes, in some quantity, in 1891, in the cellar of a brewery, Cannock, Staffordshire, it has since been met with at Brierley Hill, in the same county, (several examples), and on the coasts of Yorkshire (Scarborough), Northumberland, and Cumberland; all solitary specimens. The present record is thus a new one for the county of Lancashire.—WM. FALCONER, Slaithwaite, Huddersfield.

—: o :—

The Principal Trustees of the **British Museum** have appointed Mr. William Robert Ogilvie Grant to be Assistant Keeper of the Department of Zoology at the Natural History Museum, South Kensington, in succession to Mr. Edgar Smith, I.S.O., who will retire, by reason of age, on March 31st.

Mar. 1.

REVIEWS AND BOOK NOTICES.

From the author, Mr. Jno. Lee (Darlington : Bailey and Co.,) we have received a pamphlet entitled **Gender and Nature's Law** (101 pp.). It begins with a quotation from the late William Fowler's Presidential Address to the Yorkshire Naturalists' Union, and throughout contains a remarkable series of quotations from *The Naturalist*, the Bible, Carlyle, Haeckel, Sir Oliver Lodge, T. P. O'Connor, The Archbishop of Canterbury, W. T. Stead, Gladstone, etc. In fact the author quotes so much from these authorities that it is difficult to ascertain what his own views really are.

Secrets of the Hills, by Sterling Craig (Harrop and Co., 320 pp., 3s. 6d. net.). This book is evidently written for young school-children, and the author attempts to make his subject interesting by putting his information in the form of a story respecting one Ronald, in up-to-date boy scout costume, who wishes to know something of the structure of the earth. All sorts of subjects are dealt with, such as lead mining, the 'seraphis,' the gold fields, 'contortions'; the work of the sea; glaciers; classification of rocks; evolution of the horse's foot, etc. The book would make a suitable prize for a scholar.

The Sea Shore: A book for Boys and Girls, by F. Martin Duncan (Grant-Richards, London, x+255 pp., price 6s.). In this book the author endeavours to popularise the study of marine zoology among young people, and there can be no question that the wealth of beautiful illustrations from his own photographs will go a long way towards this. These cover almost everything from the cliffs and shore, to seaweeds, worms, starfish, sea urchins, shells, anemones, corals, crabs, etc., etc. These are described in suitable letterpress, though we much prefer the photographs. There is a magnificent coloured plate as frontispiece.

British Birds' Nests, by R. Kearton (Cassell & Co., 520 pages, 14s. net). In this excellent volume Messrs. Cassell have brought together the various parts of their serial, 'British Birds' Nests,' brought out by them a little while ago, and to which reference has already been made in these columns. As regards the descriptive matter it is characteristically Keartonish, but the illustrations, including a fair number of plates by the three-colour process, representing birds' nests and eggs, as well as some of the Rembrandt plates, are as near perfection as is possible. Several of the illustrations are old friends, but we can confidently recommend the work as a most suitable gift to anyone, young or old, having a taste for natural history.

The Lost World, by A. Conan Doyle (Hodder and Stoughton, 319 pp. 6s. net). In this remarkable story, Sir Arthur narrates the extraordinary performances of a characteristically eccentric scientist known as Professor Challenger. The story refers to the adventures of a little party who reached the top of a mysterious plateau in South America, which apparently had been isolated from the rest of the world since Liassic times. Upon this plateau Pterodactyls and other monsters of the past were still living, together with a very primitive race of man-like apes or ape-like men, and on the same limited plateau was a colony of more modern savages. Of course from the scientific point of view there are many defects in the narrative, and some incidents, such as the Professor's cartwheel performance down the stairs into the street locked in the arms of a reporter, and in his would-be-dramatic appearance among the exploration party in South America at the very moment a guide was required, seem rather weak; but as the book is to 'give one hour of joy to the boy who is half a man, or the man who is half a boy,' we can only say that his object has been achieved.

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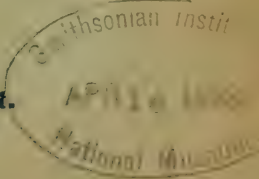
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NOTES AND COMMENTS.

SCIENCE V. MAGIC.

We learn from the *Yorkshire Observer* that an interesting and amusing demonstration of the fact that modern science offers some advantages over mediæval magic has just been afforded the inhabitants of the beautiful Vale of Pickering. In the western part of the dale a good deal of trouble has been occasioned in dry seasons by failure of the water supplies, and the medical officers of health have made strong representations to their respective authorities urging the provision of other and better sources of supply. A little while ago Amotherby was in difficulty of the kind, and the District Council was persuaded to move in the matter. In such localities, remote and delightfully unsophisticated, ancient superstitions find sanctuary still, and though it occasioned amusement elsewhere when it was reported in the newspapers, it doubtless seemed to the inhabitants as natural a thing to call in the aid of the water-diviner to find underground waters as it is to hang a stone with a hole in it in the cattle byre, or to nail a horseshoe over the stable-door, to keep away ill-luck.

WATER DIVINING.

The water-diviner, with all due rites and ritual, decided upon a suitable spot for a bore-hole, and indicated his expectation that water would be found within a certain distance of the surface. The borehole was made at a cost of some hundreds of pounds—the exact cost the ratepayers of the locality will in time come to appreciate—and water not being found at the indicated level the work was continued to about three times the depth without success, and, faith giving out under the financial drain, the work was eventually abandoned.

AN ARTESIAN WELL.

A few miles farther westward, at Oswaldkirk, where similar complaint was made of water famine in the hot summer of the year before last, the local landowner, Colonel Benson, of Oswaldkirk Hall, preferred expert geological advice to resort to the supernatural, and a borehole was put down on his estate in a spot chosen on mere scientific principles. This boring struck water about a week ago, and is yielding an artesian well supply of a hundred thousand gallons per day, delivered at a natural pressure sufficient to afford the village the safeguard of fire-hydrants if desired. Beyond meeting all domestic needs, the waste water will, if run through a turbine, be more than adequate to light the village with electricity. The discovery has occasioned a good deal of interest both among the country-folk and in geological circles, and on a

recent Saturday a party of geologists visited Oswaldkirk. The works presented, on the arrival of the visitors, a most interesting and curious appearance. The new borehole has been put down in Hag Wood, a couple of hundred yards from the hall, and some fifteen feet higher on the hillside than the old water reservoir of the village. In the expectation of an artesian supply the borehole was lined, as it was sunk, with eight-inch metal tubing, and though this tube had been continued to a height of twenty-one feet above the ground-level, the water was spurting out of the top of the tube and falling like a fountain on all sides. Indeed the bore-sinkers were themselves taken by surprise when the flow started, for though they realized from the working of their tools that water had been reached, and withdrew the boring apparatus, they were startled by the sudden drenching which they received.

GEOLOGICAL STRUCTURE.

Professor P. F. Kendall, of the Leeds University, who conducted the visitors, explained the phenomena and the geological structure of the country. He pointed out that the water-bearing stratum here is the Kellaways rock, an oolitic sandstone. Below this are the clayey beds of the Cornbrash, and above it is normally the Oxford clay. At Roulstone Scarr—the cliff which is a familiar landmark over the Vale of York, being distinguished by a great figure of a white horse cut upon it—the Oxford clay is absent, and rain falling upon the Calcareous Grits on the hillsides east of Thirsk sinks without interruption into the Kellaways rock. But the strata dip a little towards the south-east, and soon the Oxford clay comes into its right position. Thus beneath Oswaldkirk the water-logged Kellaways rock is being subjected to pressure between two beds of impervious clay. It needed but the piercing of the clay to bring the water spurting to the surface and high above it. A fault in the valley between Oswaldkirk and Gilling had squeezed the greasy Oxford clay there to exceptional thickness, so that the boring had to be carried to 316 feet below the surface before the Kellaways rock was reached. The work was continued a little further to make sure of a good supply, but when the tool reached 342 feet from the surface the workmen were ‘drowned out.’

YORKSHIRE MOLLUSCA.*

This pamphlet should serve as a stimulus to Yorkshire students of Marine Mollusca, and especially to those residing at Hull,

*The Marine Mollusca of the Yorkshire Coast as represented in the Hull Museum. By F. H. Woods, B.D. (Hull Museum Publication, No. 91, Price one penny).

to whom the perfecting of the local museum should be an ideal desire. Its title explains the main purpose for which it has been published. Incidentally it does a great deal more. Going systematically through the collection in the Hull Museum (which we gather has been made by Mr. Woods himself) the author enumerates which families are represented and by what species, giving short notes where necessary; and furnishes a running commentary on previously published lists of Yorkshire Mollusca, concluding with a list of species which have been recorded but are not in the collection. We are thus able to judge how far it is from being complete, because apart from the species unrepresented, Mr. Woods points out such as are represented only by young or immature examples. With this guide before them there is every inducement for coast naturalists to assist in making the Hull Museum a fully representative collection of the various stages of every species that may occur on the Yorkshire Coast. That a collector residing so far away from it should be able to make such an excellent contribution to the subject, gives good ground for the belief that an equally enthusiastic one living near the coast would, in a short time, fill up most of the gaps referred to.—E.G.B.

THE PENNANT COLLECTION.

We recently referred to the gift to the nation of the Pennant zoological collection. We since learn from *Nature* that among the birds are two very interesting specimens of the Capercaillie. These probably represent the old British stock, which became extinct in Scotland about 1760. If so, they are its only known representatives. 'Further examination may prove the right of the British bird to rank as a distinct race. The capercaillies now found in certain parts of Scotland are the descendants of Scandinavian birds introduced about 1837 by the Marquis of Breadalbane at Taymouth Castle. . . . It is stated that Mr. E. Smith has found that a British snail described by Pennant as *Helix refescens* turns out to be a young specimen of *H. arbustorum*. For the British species, which has hitherto been incorrectly identified with *H. refescens*, the name *H. montana* is available.'

FAUNISTIC WORK IN THE ANTIPODES.

From a former Editor of *The Naturalist*, Mr. E. R. Waite, we received some time ago three well-illustrated monographs on the birds, fishes, and mammals, respectively, of the Sub-antarctic Islands of New Zealand. Mr. Waite is now the Curator of the Canterbury Museum in New Zealand, and is apparently carrying out his work there with the same thoroughness and enthusiasm that he did when in Yorkshire.

ANIMAL LOCOMOTION.

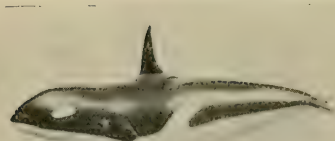
The Horniman Museum has issued 'A Handbook to the Cases illustrating Animal Locomotion.'* It deals in a very instructive manner with numerous divisions of the animal kingdom, under the heads of swimming, creeping, burrowing, running, jumping, climbing, parachuting, and flying. As a frontispiece is a plate from photographs of mackerel, ichthyosaur, whale and dugong. Below it is the following description: "Convergence is the term applied to those cases in which the bodily forms of animals not genealogically related tend to



1) Mackerel.



(2) Ichthyosaur.



(3) Killer Whale.



(4) Dugong.

resemble one another as the result of a similar mode of life. Each of the animals illustrated above, for example, has acquired its torpedo-shaped body, fin-like limbs, and flute-like tail in adaptation to an aquatic life quite independently of the others.' The pamphlet has been written by Mr. H. N. Milligan.

FOSSIL BEADS.

In the *Geological Magazine* for March a Mr. Banton writes a note on 'Fossil beads (?) from the gravel of Bedfordshire: Are they evidence of human workmanship?' He refers to the small perforated marble-shaped objects found in chalk

* London County Council, 46 pp. One penny.

gravels, and states that 'possibly some of them may have been artificially fashioned and drilled for stringing. . . . May I not pertinently ask, does not the occurrence of these beads point to a higher state of development in palæolithic man than is usually supposed?' And he refers to cave paintings, etc.! In a lengthy note Dr. Henry Woodward shows that these 'beads' are chalk sponges, known as *Porosphæra globularis*, and not evidence of human workmanship at all. This is perhaps as well, or we should have to invent Palæolithic man to account for the hundreds of these 'beads' which occur in the Holderness gravels, and a much 'palæolithic-er' man to account for similar specimens which are found in the solid chalk of the Yorkshire cliffs! We are indebted to



Dr. Woodward for the loan of the block which accompanies his note.

ECONOMICAL ENTOMOLOGY.

The Bureau of Entomology has issued two publications entitled *The Review of Applied Entomology*. One is further described as 'Vol. I., Ser. A, Part I., pp. 1-32,' and the other, 'Vol. I., Ser. B, Part I., pp. 1-20.' Both are dated January, 1913; both are published by Dulau's, one at sixpence and the other at ninepence. The publications contain summaries of papers bearing upon various branches of 'Agricultural' and 'Medical and Veterinary' Entomology, (further sub-titles!) respectively. These summaries vary in length from a few lines to three or four pages, and are similar to *Science Abstracts*, and the reports of papers which are given in *The Journal of the Board of Agriculture*. As these summaries are accompanied by detailed particulars of the publications in which the papers appear, we should have thought that the editors would have attempted to simplify the titles, etc., of their own publications. And instead of having two different series published simultaneously, with similar pagination, but different sub-titles and different prices, surely it would have simplified matters to have published both, with the title *Review of Applied Entomology*, in one cover, and at the price of a shilling?

ARE OUR SUMMER BIRDS DECREASING ?

An inquiry was instituted last year by the Editor of *British Birds* to ascertain whether our Swallows and Warblers are decreasing. From this year's recorded observations it seems certain that a marked and general decrease of Swallows and Martins has been going on for some time, and that the Shrike, Whinchat, Redstart, and Wryneck are probably decreasing. On the other hand the Nightingale and most of the Warblers are holding their own and some are even increasing.

BIRD NOMENCLATURE.

An interesting correspondence has recently taken place in the natural history column of the *Yorkshire Weekly Post*, in which several prominent Yorkshire ornithologists have taken part, on the vexed question of Bird Nomenclature. One or two important points have been raised by our contributor, Mr. Riley Fortune, which we are glad to quote :—‘ The everlasting creation of sub-species is causing a great deal of useless and senseless slaughter among even common birds. Many of these birds were left alone by collectors, but it is now necessary for them to fire into the midst of every flock of small birds in order to see if they cannot find a few sub-species among them, or, what is more important, if they are lucky to find one with a different spot on it, or a feather a trifle longer, or the colour a shade or so darker than the generally accepted type, then they can be made supremely happy by being able to create and name a fresh sub-species !

WILLOW TIT OR MARSH TIT.

Unfortunately many of them find great difficulty in recognising these sub-species, for we generally read, in the record, that the bird has had to be sent to Tring for the High Priest of this cult to determine whether it is a good record or not. Then, again, the creation of the new species is proceeded with in the flimsiest manner. Take the willow tit. It is practically impossible to separate this bird from the marsh tit when alive and active, and in order to discover whether the willow tit may or may not be numbered among the avian members of a county, it is necessary to shoot numbers of harmless marsh tits in the hope that one of them may possess the characteristic points of the willow tit, the habits and general appearance of the two being precisely alike.

THE NEW NOMENCLATURE.

The proposed new nomenclature is hopeless and ridiculous. The type form of the common wren is now to be called (if these people have their way), in scientific language, *Troglodytes troglodytes* ; the hawfinch *Coccothraustes coccoth-*

raustes coccothraustes; the partridge *Perdix perdix perdix*. Can anything be more absurd? Equally absurd is the endeavour to deprive the song thrush of the name by which it is known to all English-speaking naturalists, *Turdus musicus*, to tack this on to the redwing, and call the song thrush *Turdus philomelus Clarkei*—and this sort of upheaval is to apply to many of our common and well-known birds. If this sort of thing is persisted in, every small clique of naturalists who fancy the work, can thrust upon an inoffensive public a new nomenclature. Then the best thing will be to ignore scientific names altogether, and use the ordinary English names.

SUB-SPECIES.

The absurdity of this sub-species creating has been fully demonstrated in two of the latest discoveries, one of which is to create a sub-species of the British black game, because, forsooth, the female differs somewhat from what they consider the type; the male, mind you, being no different. The lesser black-backed gull has also, on account of its size and different colour of the mantle, to be added to the distinguished list of sub-species. The fallacy of this can easily be seen by any one who will visit a big colony of these birds, where they will be seen to vary considerably, not only in the shade of the mantle, but also in size of the individual birds.'

THE KELLAWAYS ROCK OF SCARBOROUGH

At a recent meeting of the London Geological Society, a paper on the 'Kelloway Rock' of Scarborough, was read by Mr. S. S. Buckman, F.G.S. The Author has studied the types of ammonites from the Kellaways Rock described by Leckenby, preserved in the Sedgwick Museum, Cambridge, and a series of Yorkshire Kellaways Rock ammonites from the Museum of Practical Geology, London. He has grouped these ammonites according to their different matrices, and finds that they indicate several different zones. These zones he arranges in sequence, and suggests how they may be compared with the sections of Kellaways Rock of Scarborough given by Leckenby and by Fox-Strangways. The exact order of the zones is, in one or two cases, not considered to be proved, but the paper is offered with the idea of indicating where further work is required. An examination of the ammonite fauna of the Yorkshire zones shows that the so-called 'Kellaways Rock' of Yorkshire is in part contemporaneous with the Oxford Clay of the Midlands and the South of England, and in part contains faunal facies not represented in these areas, but peculiar to Yorkshire so far as England is concerned; they show, however, some affinity with faunal facies in Russia and in Normandy.

AND ITS AMMONITES.

An examination of the list of species of ammonites recorded by Fox-Strangways from the Oxford Clay of Yorkshire shows that the Oxford Clay of Yorkshire itself is not in the main sequential to the Kellaways Rock, but is contemporaneous with it, leading to the inference that even in Yorkshire itself part of the Kellaways Rock is only a local manifestation, and that it passes laterally into Oxford Clay. A table of zones is given in order to illustrate the contemporaneity of the Kellaways Rock-Oxford Clay deposits of Yorkshire and the Midlands, while at the same time showing the various non-sequences in both areas. Some critical palæontological remarks are made concerning the identification of certain species of ammonites, and there is a correction of nomenclature, with a new name for a species misidentified on account of homœomorphy. This leads to a few remarks on development and homœomorphy, wherein an important difference in the mode of development of certain Kellaways Rock-Oxford Clay genera is pointed out, and it is remarked that there are three methods of homœomorphy—(1) subparallel, the likeness of stocks passing through similar stages; (2) transversal, the likeness of stocks starting from different forms meeting at a cross-over or collision-point; and (3) cyclical, the likeness of an anagenetic to a catagenetic series.

THE NAME ' KELLAWAYS.'

For some reason which Mr. Buckman doubtless considers sufficient he retains the name ' Kellaways ' for the rock south of Yorkshire, but for the Scarborough representative of the deposit he gives Leckenby's spelling ' Kelloway.' The bed derives its name from Kellaways in Wiltshire, and while Yorkshiremen, and particularly Yorkshire geologists, are often peculiar people, we see no reason why they should be permitted to alter the name of a deposit merely because it occurs on their classic ground. If this method is continued, we presume the other Yorkshire deposits will be having their names similarly altered. For example, the Oxford clay, so called from its great development in Oxford, will be altered, and the nearest word we can think of is the Oxo clay—which we beg to suggest! Mr. Buckman does not appear to have referred to the remarkably fossiliferous section at South Cave, in South Yorkshire, where ammonites are particularly plentiful.

At a recent meeting of the Leeds Geological Society, a roll-top desk, attaché case and illuminated address were presented to Mr. E. Hawkesworth in recognition of his services as secretary to the Leeds Society; and Mrs. Hawkesworth was the recipient of a pearl, amethyst, and emerald pendant.

THE CLEVELAND IRONSTONE.

J. J. BURTON, F.G.S.

'CLEVELAND Ironstone' is a term very loosely used and understood. When one hears the expression 'the discovery of Cleveland Ironstone' it is generally applied to the Ironstone which has had or is having a commercial use, but in dealing with the subject from a geological, rather than from an industrial point of view, the whole aspect of the question is changed, as seams too thin to be worked profitably, or too poor in quality to be worth smelting, are as interesting and important, and present problems as difficult of solution, as the main seam which is the one principally worked for iron-making purposes. Indeed, to obtain a clear view of the subject, the geologist must dismiss from his mind all questions of commercial value, and apply himself to a study of the whole series of Ironstone deposits over the Cleveland area and beyond, whether the deposits are formed in the Lias or the Oolitic formations, as they are all so closely interlinked that to ignore any portion of the deposits may lead to very erroneous conclusions.

We must therefore enquire what and where deposits exist; how they came there, and from whence the ferruginous material was obtained.

Before we deal with these aspects of the question however, brief reference should be made to one or two matters of human rather than scientific interest.

The discovery of the main seam is usually associated with the names of Bolckow and Vaughan, and the date about the year 1850; but this, like many other popular beliefs, is a myth, although to that firm belongs the credit of being the first to use it on a large scale. It is however recorded by the late Sir Lowthian Bell that Ironstone from Robin Hoods Bay was sent to the Tyne between 1745 and 1800, and that soon after 1800 Ironstone was obtained from the beach between Scarborough and Saltburn and used by the Tyne Iron Company. In 1811, Wm. Ward Jackson sent six or eight *cartloads* from the Normanby Estate to the Tyne; and thence forward every few years there are numerous records of the existence of the main seam on the coast, and also inland. Although the early users of the stone do not seem to have made any mention of the fact, they must have been well aware that the stone they gathered from the beach at the foot of the cliffs must have come out of the cliffs themselves. It is probable, however, that mining the stone was not then practised because the profit on the gathered and transported stone left too little margin for any more costly method of procuring the supply. My own opinion is that the discovery and use does not commence within the last century and a half, but dates back 2000 years or more if we do not confine our survey to the main seam only,

which was perhaps the least suitable for use by early races of men. Implements of war and husbandry were used by the Britons, and as local material was used whenever it existed, it seems probable that many a lusty blow was dealt by bill-hooks of local iron wielded by the Brigantes inhabiting Cleveland. The crude but efficient methods they adopted would doubtless be applicable only to the ores of Oolitic formation, which are found plentifully throughout the dales; and not to the Lias stone.

The local ores may or may not have been used by the more highly civilised Roman conquerors. It is probable that their greater knowledge and their better system of inland transport would lead them to the use of hæmatite ores principally, but that they did manufacture iron is pretty clear from the fact that a few years ago a Roman bloom of that metal was found near Hexham.

The Chartularies of many abbeys shew that the monks were mine-owners, and the chronicles prove them to have been Ironmasters.

It is clear therefore, that any investigations must be into the whole of the iron-bearing strata, whether we regard its existence from an industrial and historical point of view, or from that of geology only.

The local ore is found in nodules in the upper portion of the Lower Lias.

In Middle Lias.

In The Dogger.

In the Ellerbeck bed of Goathland, Egton, Ingleby and Snilesworth.

In the Grey Limestone.

In the Upper Estuarine Series in Fylingdales,

In the Cornbrash in Newton Dale and Ryedale, and

In the upper part of the Kellaways rock on the moors about Danby.

The various seams, however, are not continuous throughout the area, and seams which are continuous in section at one place, are in other places split up into bands with shales of varying thickness between, so that the problem of formation becomes very complicated, and is further intensified by the different lithological and chemical characteristics of the various seams, and of the same seam in different areas. Take for instance Eston on the north side, the main and Pecten seams are one; at Upleatham they are split into three with one band of shale; at Staithes into seven with six bands of shale. At Hawkser it is difficult to assign any of the seams of shale and Ironstone to any corresponding seams at Staithes, although the separating distance is only $12\frac{1}{4}$ miles.

I have prepared a series of diagrams drawn to scale vertic-

ally, which illustrate this diversity, and it should be noted that the diagrams deal only with the Ironstone series of the *Spinatus*-zone of the middle lias.

If we examine any one of this series of either shale or ironstone, or indeed almost any of the ironstone beds, we find, in more or less abundance, fossils of many forms of marine life ; and as most of the shell remains consist of carbonate of lime, often in an altered condition, we are forced to the conclusion that the deposit of iron-bearing strata cannot have been formed in the condition in which it now exists, and indeed that no iron solution could have contemporaneously permeated the beds as they were laid down. The very abundance of shells throughout the whole zone negatives any idea that there was a ferruginous sea existing when and where the ironstone beds were deposited.

Many writers have carefully considered the question of the nature of the original deposit and in almost all cases they have arrived at the conclusion that the beds were of carbonate of lime. The evidence is not absolutely beyond question, as there are difficulties not easily explained, but by a process of eliminating every other imaginable idea of the original condition of the beds, it seems fairly well established that they were at first an impure limestone.

This is known as the replacement theory, and if it is correct, we have only advanced one step, as the origin of the interstratified limestones and shales has to be sought, and then the question as to how the lime has been substituted by iron, and whence the iron was derived must be answered.

Limestone has many sources. *First*, the Chemical. Carbonic acid from the atmosphere combines with rain water, and as it permeates the surface of the earth, the solution is strengthened by decaying vegetable matter. This weak solution of Carbonic acid dissolves certain mineral constituents of the soil, and, in particular, lime. The lime-charged water issues as springs, loses part of its Carbonic acid by evaporation of the solvent medium, and deposits the lime as a carbonate. A very similar action takes place between Carbonic acid and iron. The chemically formed limestone, however, is comparatively small in extent.

The second source is the accumulation of abandoned 'house-boats' of organisms living in the sea. These house-boats are composed of carbonate of lime which the owners built by abstracting the material from the waters carried down to the sea by inland streams.

The third source is the destruction by denuding, but not necessarily dissolving forces, and the carrying away in suspension by streams of the denuded material, which has again been deposited.

To which of the three do the Cleveland beds belong?

The thin bands in some places; the ever constant evidence of a changing littoral in some parts of the area; the strong suggestion of estuarine conditions here and there, and the probability that shallow water prevailed where the seams are thickest, prove to my mind that the beds are not directly organic. Microscopic examination reveals nothing more than a comminuted fragment of a shell, perhaps as the nucleus of an Oolitic grain, and I am strongly of opinion that the beds were formed out of the debris of pre-existing limestone formations. The mixture of impurities of silica and alumina strengthens this view. The Permian, Triassic and Liassic period was one of great earth movements, and the older rocks to the west were being elevated and fractured. It is probable, if not certain, that much disturbance of a volcanic nature was in progress to the north-west, giving exactly those alternating conditions of stability and instability required for the rapid wearing down of pre-existing rocks, including Permian and Carboniferous formations, which are necessary for the building up of the Lias, and the ironstone series in particular. Mr. Stead, in his usual thorough manner, has investigated this subject, and has given the results in a paper read before the Cleveland Institute of Engineers in February, 1910, where he says he believes he found the original substance imprisoned in the vertebral column of a *Plesiosaurus propinquus*, occupying what was originally the spinal cord. It consisted of Oolitic mineral closely resembling the ironstone itself in every particular. The bone surrounding it was very dense, and it appeared to be possible that the substance inside, being surrounded by a dense non-porous envelope, might have been protected from the influence of percolating solutions, and would perhaps approximate in composition and character to the original deposit.

He gives the analyses of both the fossil bone and the imprisoned substance; that of the latter is:—

Ferrous carbonate	15.58% dried at 212° F.
Iron Pyrites	0.82
Alumina	7.00
Silica	19.80
Calcium carbonate	51.16
Calcium Phosphate	2.53
Magnesia	1.67
Organic matter, etc. ..	1.44
	<hr/>
	100.00
	<hr/>

The lithological character of the substance under the microscope closely resembles that of the Ironstone.

Dr. Sorby, Hudleston, Tate and Blake, and other authorities, all support the replacement theory. The substitution of iron for lime is quite a practical operation in nature's workshop, where the conditions are favourable. As already pointed out, a solution of Carbonic acid will take up a portion of iron from the rocks through which it passes. Bicarbonate of iron in solution, in open water, will, on coming to the surface, take up a molecule of oxygen, freeing the Carbonic acid, and forming Fe_2O_3 . On this taking place it immediately combines with water and sinks to the bottom, where, if there happens to be any decomposing vegetable matter, the carbon it contains abstracts a molecule of oxygen from the Fe_2O_3 , the abstracted oxygen molecule going to make up Carbonic acid and leaving the iron as FeO , and so the fight goes on indefinitely between the iron salts and carbon, with the one molecule of oxygen as the bone of contention. In this way are many lake deposits of ferruginous material formed. Some of the iron formed in Permian and later times may have been mechanically transported and deposited simultaneously with the limestone, but probably the greater portion of the iron found was carried down with the clays which now form the shale bands above the ironstone. These shale bands have been elevated, and have at some period of their existence, and perhaps, for considerable periods, been swampy estuarine beds, on which, in the warm Liassic seas, plant life would quickly form and decay. The iron in the shales would probably be a ferric oxide (Fe_2O_3), and as the carbonaceous matter produced Carbonic acid and acted upon the ferric salts, a bicarbonate of iron would be formed, which would percolate through the soft strata of the period. According to Dr. Irving, the calcium of the limestone rock would take up the strong acid of the iron salts, leaving Carbonic acid available for union with the iron as ferrous carbonate (FeCO_3 , or Siderite). The change produced by percolations of ferrous carbonate through limestone is thus simply put by Dr. Stead, following Dr. Sorby:— CaCO_3 solid + FeCO_3 in solution = FeCO_3 solid + CaCO_3 in solution.

Dr. Stead gives the constitutional analysis of the Cleveland Main Seam as 44.97% of Siderite (FeCO_3) by weight

(FeO 27.91)
(CO ₂ 17.06	44.97)

The principal difficulty in the replacement theory is the fact that fossil shells occur which have not been converted into carbonate of iron and still remain carbonate of lime, and the question naturally arises, why, if the replacement theory is correct, were these shells not also converted into carbonate of iron?

No entirely satisfactory answer seems to be forthcoming,

but as there are differences of both a physical and chemical character in various parts of the many seams of ironstone, shewing that the conditions prevailing at the time were not uniform, may it not also be that these same varying conditons may account for the substitution of iron for lime in one case and not in another ? The time the changes took place is not known, and it is quite possible that the time between deposition and substitution was long enough to allow other changes, as for instance the shells may have crystallized into calcite, which is much less soluble than limestone—and “it is remarkable that nearly all the shells found in the Cleveland Ironstone beds mainly consist of calcite in distinct crystals differing entirely from the structure of similar shells of the present day, which if crystalline at all are only microscopically so.”* There is the further possibility that some of them may have received a silicious coating, thus adding greater resistance to the attack by the carbonate of iron solution. It has been shown by several writers that the surface of some of the shells has been partly or wholly converted into carbonate of iron, while the interior still remains calcite, so that it may well be that at the infinitely slow rate of many of nature’s processes the time has not been sufficient for a complete change and that the work is even now in progress, rather than that it has been arrested.

Dr. Sorby made some interesting experiments on the action of chloride of iron on calcite, which are given in *The Naturalist* No. 597, 1906, where he says:—“Since writing my original papers I devoted much attention to the production of artificial pseudomorphs, especially including those in which carbonate of lime is replaced by carbonate of iron. Crystal of calcite or portions of Iceland spar were sealed up in tubes with a neutral solution of iron protochloride and heated to various temperatures. Kept for a few weeks in the boiler of a high pressure steam engine, at a temperature somewhat under 300° F. replacement was somewhat rapid, and pseudomorphs were formed as hard as any similar natural product. Kept much longer in a boiler at a temperature varying up to 212° F. the replacement was slower, and the pseudomorphs much more tender. I sealed up a piece of Iceland spar in a glass tube so full of the chloride that there was a mere trace of air left, and after keeping for a few years the replacement was so small that I came to the conclusion that it did not take place at the ordinary temperature, but on re-examining after thirty-six years, though the amount of replacement was small, there could be no doubt about its having occurred. This shews the importance of such long continued experiments, and proves that the changes met with in the Cleveland Ironstone may have taken place at the ordinary temperature of the rocks.”

* Dr. J. E. Stead, *loc. cit.*

Of course these experiments were made under conditions which were intended to produce results in a lifetime and cannot be compared with the weak solutions and unlimited time with which nature works, but the results obtained support the suggestion that the replacement action in the ironstone beds may not have entirely ceased, although we are unable to detect the means by which it may still be carried on.

The chemical side of the question has been so fully dealt with by others that it is unnecessary to go further into it now. If, however, it is clear that the conversion of limestone into ironstone is possible, there is still to be considered the source of the iron which has replaced the lime.

Iron is one of the most universally diffused substances in the composition of the crust of the earth, and during the enormous period of time which has elapsed since the envelope round the unknown condition of the interior became solid matter, many and often repeated cycles of chemical change must have taken place. Iron has been segregated and again diffused under the changing conditions which have taken place.

The New Red Sandstone, for instance, has taken up a thin pellicle of iron as a covering to the grains of sand of which it is composed. Springs have in their wanderings through the interior taken up from the rocks and soil large quantities of iron in solution, and left it as a solid deposit in streams and lakes. Earth movements have produced faults and cracks and fissures, and by friction have generated great heat ; and mineral veins and iron bearing lodes have resulted. Lavas from volcanoes and dykes have spread over, in, and under the surface, and these contain vast quantities of iron.

From sources of this character all the iron necessary for the Cleveland beds might have been obtained.

It seems probable also that the physical conditions in later liassic times were such as would permit us to contemplate the derivation of the iron from these sources.

On the sections and the map on which I have drawn the lines of the sections, it will be seen that at Eston the main seam is the thickest, and that as we proceed east and south, clay shales and ferruginous shales take the place of the ironstone ; and if the section had been continued south and south-east as far as the beds are recognisable, to say, beyond Thirsk, the same thinning of the seams and replacement by shales would be seen. These records of the material carried down by Liassic streams indicate very clearly that when the Eston main seam was under water the shore line of the ancient sea was not very far distant and that there must have been streams carrying out the finely divided wreckage of land areas, east and south, in suspension.

It is generally admitted that the area of the Penines north

and west was, at this period of geological history, dry land, and probably rising, creating a slope to the east, which is exactly the condition necessary for the formation of the Lias deposits of Yorkshire. It was also the area, as was that of the South West of Scotland, where the greatest disturbance was going on and seismic and plutonic forces were most active. So that in the region from which the streams probably ran were those physical features, natural forces and lithological conditions necessary to explain the source of the mineral constituents of the Cleveland Ironstone.

It must, however, be conceded that for a full explanation of the whole series it is necessary to assume that deposition was not continuous, but intermittent or interrupted, and that there were many alterations in land and sea level, but I think we are fully justified in reasoning from effect back to cause, and in saying that such oscillations of land and sea level did take place during the whole of that period. The same action must have been repeated time after time.*

(To be continued).



'How birds make love,' is the title of an article in Part 27 of Cassell's *Nature Book*, by Mr. Oxley Grabham.

Mr. J. Arkle refers to the forms of *Cænonympha* in various northern counties in *The Entomologist* for March.

In *The Scottish Naturalist* for March, Mr. W. Eagle Clarke describes A New Racial Form of Song-thrush from the Outer Hebrides, with the name *Turdus musicus hebridensis*.

On the strength of specimens found at Radcliffe-on-Trent by Professor Carr, Mr. K. J. Morton, in *The Entomologist* for March, writes on 'An Addition to the List of British Plecoptera: Reinstatement of *Chloroperla venosa*.

In a note on 'The Origin of Septarian Structure,' by Dr. A. M. Davies in *The Geological Magazine* for March, he refers to the fact that this structure is due to *expansion* of the nodules, and not to contraction as is usually supposed.

From an article by the curator, Mr. F. Williamson, in *The Museums Journal* for March, we learn that 'Rochdale now possesses an Art Gallery and Museum which compares very favourably with those of many much larger towns and cities.'

The Museums Journal announces the death of Robert Cameron, who was for many years honorary curator of the Sunderland Museum, and 'was in advance of his time in the broad views he took of the potential value of museums in the general scheme of education.' He was in his eighty-eighth year.

* The question arises, was the iron in the interbedded shales, or in the Estuarines of the Upper Lias and Inferior Oolite? I think in the interbedded shale, as there is not much evidence of leaching in the Upper Lias, and the iron and the limestone does not shew that diminishing ratio of iron to lime in the lower beds that one might expect if it had to pass through and leave some of it in the upper beds.

THE COMPOSITION OF PEAT, AND ECOLOGICAL METHODS.

J. W. HAIGH JOHNSON, B.Sc., F.L.S.
Walton, Wakefield.

SOME time ago, in the pages of *The Naturalist*, was an abstract from a paper read before the Botanical Section of the British Association meeting at Portsmouth.* This paper dealt with the relationship between our Moorland Flora and the composition of the peaty soil supporting it. Such peaty deposits naturally contain a large and variable amount of water, and therefore on drying leave a small amount of residue. This fact evidently impressed the contributor very greatly as is shown by the unusual method of stating the results obtained.

As a rule 100 per cent. is approximately the limit to the sum of the component parts of most terrestrial substances of which we have hitherto any cognisance. Occasionally, however, in extremely carefully conducted analyses it has happened that this sum total has exceeded the usual 100 per cent., and in one case at least, the discrepancy led to the discovery of an entirely new element; but, even this error amounted to only three or four per cent. The author was, perhaps, led to emulate this classical result, and, nothing daunting, produced figures showing undoubtedly 170 per cent. of water, followed later by the incomprehensible figures of 200, 300 and even 600 per cent. of this substance, but these figures on closer examination appear to be ratios and have nothing whatever to do with percentage composition-amounts. The misleading nature of these results is readily seen by comparing two peats containing say, 200 and 300 per. cent. of water. This, as ordinarily expressed, amounts to 66.66 and 75.00 per cent. of water respectively, so that the difference of 100 per cent. as given, amounts to $75.00 - 66.66 = 8.34$ per cent. as usually understood. This simple example serves to illustrate the erroneous results obtained by confounding ratios with percentage composition. It is obvious such ratios can never form a basis for comparison with these figures; and to this error much of the enigmatical character of the whole paper may be attributed.

In the papers quoted there is also a further difficulty namely that air-dry peat—which forms the basis of his figures—itself contains a very variable amount of water (15-25 per cent.), and this amount is not given in the results. The amount of

* Report of Brit. Assoc., 1911. 'The Water-Content of Acidic Peats,' by W. B. Crump, M.A., pp. 581-582; *The Naturalist*, 1911, pp. 361-362. 'The Wilting of Moorland Plants,' pp. 582-583; *The Naturalist*, 1911, pp. 343-344.

moisture still retained in air-dry peat depends upon many factors; time, temperature, humidity of the atmosphere, fineness of division of the peat when drying, and so forth; these factors introduce such a large 'personal equation' into the manipulation, that results could scarcely be considered concordant unless great detail in method employed were observed. It is, however, gratifying to know that 'without a knowledge of the humus-content, the *water-content*, was meaningless'—which is not very surprising!

Turning to the humus-content, we do not fare much better, for evidently 'humus' is not identical with 'humus-content,' as will be seen presently. The 'humus' is generally represented by 'loss on ignition'—or as it is often called, 'the organic and volatile matter,' and this for all practical purposes is equal to the moisture-free peat—as good peat contains only a small amount of 'mineral matter' or 'ash' (see appended analyses). But the author says 'The ratio $\frac{\text{Humus}}{\text{Mineral}}$ is also a convenient way of expressing the humus-content'—this may be so—but one ventures to suggest that *Humus less Mineral* would be a much more accurate way! The magnitude of this error may be readily understood from results given in the author's analyses (B. A. Report, p. 582; *The Naturalist*, p. 362), where 'Pure Eriophorum-Moor Peat contains humus 80 per cent., and ash 2 per cent.; this, according to the 'convenient method' has a humus content of $\frac{80}{82}$ or 40, instead of 80 less 2, or 78. While in the Transitional Eriophorum-Moor Peat containing 50-80 per cent. humus and mineral matter 10-40 per cent. the discrepancy will be even greater. If the above be the method of obtaining the humus and water-contents of peat, what can be the value of $\frac{\text{Water-content}}{\text{Humus-content}}$ as hus obtained? One indeed can scarcely imagine, but it is very satisfactory to learn that it 'reduced them to order.' In addition to the above 'water' figures there is still some uncertainty as to which represents the physiological water-content of the peat; and further, one would naturally expect that in determinations made on *acidic* peats to find at least some relative indication of the amount of acidity, if not the actual amount, present!

In order to correct any false impressions about the composition of peat, and to illustrate the method usually adopted, the following analytical details of two samples of peat obtained from our Yorkshire Moors may be found useful.

The first column in each case gives the results obtained on analysis of the sample as taken; the second column the same results but the percentages are calculated on the dried peat and here, naturally, *the moisture does not in any way enter into the*

composition! Both samples were of a pasty consistency when obtained and it is certain that the water percentage is approaching the limit of what may be termed 'solid' peat; a further increase of this constituent would undoubtedly constitute 'bog' or 'swamp' condition.

	RISHWORTH MOORS.		CALDER VALLEY (Dean Head).	
	Parts per cent.		Parts per cent.	
Moisture ..	85.2	(Moisture-free peat).	84.85	(Moisture-free peat).
*Organic and Volatile Matter	14.35	96.96 ('Humus')	14.60	96.37
Ash .. ..	.45	3.04	.55	3.63
	100.00	100.00	100.00	100.00
*Containing				
Nitrogen	.173	1.170	.172	1.13
Acidity ..	.098	.66	.55	3.63
Water content				
Ratio 100 pts. dry peat		575		575

Peat usually contains 80-90 per cent. of moisture and when air dried, 15 to 25 per cent.; the organic and volatile matter of the moisture free residue contains 50 to 64 per cent. of carbon, 4.5 to 6.8 per cent. of Hydrogen, 28.0 to 44.0 per cent. of Oxygen and .5 to 2.5 per cent. of Nitrogen. The moisture-free peat also contains a fairly large and variable amount of mineral matter, 3 to 15 per cent. or more. The ash, unlike that of wood, is not alkaline, and is usually infusible; its composition also varies considerably, sulphates and carbonates of lime and magnesia, ferric oxide and silica being usually the most prominent constituents.

The 80 to 90 per cent. of moisture in peat is very difficult to deal with, and cannot be got rid of by pressure. The reason for this is that 'peat substance' consists of vegetable debris, the cells of which contain and are surrounded by a slimy 'hydrocellulose' formed by the prolonged contact of the original cellulose with water. Although this constituent is present to the extent of 0.2 to 1.2 per cent. only, it is in the form of an enormously swollen jelly of the constituency of soft-soap, and contains as much as 25 times its own weight of water. When submitted to pressure it may be forced through the interstices of stout canvas quite unchanged. It is, however, rapidly hydrolysed by water at 150° to 200°C., forming the soluble dextrose, and after such treatment the peat readily parts with its water under pressure.

From a comparison of these two accounts of the composition of peat, one must conclude that in Ecology, as in other studies, there are those who perhaps, becoming over zealous for the cause, give aberrant accounts of well-known facts, so that to the ordinary individual there is still occasional need of 'Lux in tenebris' in matters ecological.

REVIEWS AND BOOK NOTICES.

The Story of Our Trees. By Margaret M. Gregson, B.A. University Press, Cambridge. Pp. xii. + 160, 2s. 6d. This is the third part of the Cambridge Nature Study Series, edited by Mr. Hugh Richardson, and deals in a simple and practical manner with the more important and interesting problems of tree life. The book is admirably suited for teachers giving nature study lessons, who will find here many useful hints on observation, experiment, and practical work both in and out of doors. The chapters are arranged as weekly lessons extending from the first week in October to the third week in June, and in each case details are given of materials required, practical work and home work. There are also four appendices giving lists of reference books, diagrams and lantern slides, material and revision questions. The seventy-four illustrations are mainly from familiar figures and are helpful. The figures of catkin flowers are in some cases very diagrammatic. These are puzzling structures to study for older students, and evidently the author has not always succeeded in interpreting them correctly.

Forestry in New England. By R. C. Hawley and A. F. Hawes. Pp. xv. + 479. Chapman and Hall, 15s. net. The American is evidently awakening to the seriousness of the disappearance of old forests, and one of the objects of this book is to help on the propaganda of the State departments. Intended primarily for New England students, a much wider field of usefulness has been present in the minds of the authors. Throughout the language is free from unnecessary technicalities, and can be followed by the landowner and general reader with interest. The first part serves as a general text-book of forestry, the second deals especially with practical forestry in New England. The characteristics of the important trees are given and the animal and plant pests infecting them, also the cause and effect of forest fires. Interesting chapters deal with the original forests and also present forest conditions. The four tree regions are considered in detail, viz., spruce, northern hardwoods, white pine, and sprout hardwoods, and at the end of each are short summaries indicating the general conditions and economic prospects. The progress of forestry in the six states is dealt with and indicates the great interest taken in forestry problems. Two folding maps show the four forest regions and the location of railways with respect to them, and there are also many photographic illustrations.

Identification of the Economic Woods of the United States. By S. J. Record. Chapman and Hall, 1912. 5s. 6d., pp. iv. + 117. The identification of woods by microscopic characters has often been attempted, but not always with satisfactory results. In this respect the practical man, with his long experience and ill-defined methods, is a surer guide in matters of identification than the laboratory man with his microscope. It is well, nevertheless, to give close attention to microscopic structures, and a study of them is a valuable aid to our knowledge of timber. Mr. Record's book is a useful guide to the study and identification of American woods, many of which possess distinctive microscopic characters. Others, however, are more elusive, and the author has occasionally to admit that 'the microscopic features so far as recognized are of little assistance.' Microscopic characters are therefore necessary, and in the 'Key,' with which the book concludes, both are used for purposes of identification. However, along with practical experience in handling woods, students will find this book very useful as a laboratory guide. It is illustrated with thirty-one excellent photomicrographs and numerous good and clear text figures, and there is also a map of the natural forest regions of the United States. In addition to the structural features, chapters are devoted to the physical properties of wood, e.g., density, water-content, shrinkage, hygroscopicity, penetrability, and conductivity.

RECENTLY DISCOVERED FUNGI IN YORKSHIRE.—VI.

C. CROSSLAND,
Halifax.

THE following is the sixth batch of newly discovered Fungi in Yorkshire, since the publication of the Fungus Flora. Fifty-five additions have been made to the county flora. Fifteen of the fifty-five are new to the British Isles. Nine or ten of these were met with at the two Sandsend meetings last year, along with about twenty other of the Yorkshire additions. The total specific records for the county now stand at 2,950, a long way over half the number so far recorded for the whole of the British Isles. No species new to science were found last year.

Descriptions of four or five of the new British records are incorporated in the report. 'Nat.', Jan., pp. 24-5; for remainder see below. It will be noted that two of these were found on damp paper, a substance pretty well liked by many most beautiful moulds.

NEW TO BRITAIN.

MYCENA SEYNII Quel. 'Nat.', January, 1913, p. 24.

MYCENA CHLORANTHA Fr. Flo. Dan., t. 1614, f. 2.

N.E.—Mulgrave Woods. Among moss, F.F., 1912. 'Nat.' 1913, p. 28.

'*Pileus campanulate, very obtuse, green, 2-3 lines high; gills sinuate-adnexed, rather distant, tinged green; stem about 2-5 cri. long, very slender, greenish.*'—Mass. Eur. Agar, p. 39. (To precede 218).*

This beautiful species was discovered and illustrated by a coloured figure by Fries in 1815, from Swedish specimens. It has only very rarely been observed since, probably due to minute size and greenish colour, which renders it inconspicuous when growing among moss.

MYCENA SIMILLIMA Karst.

N.E.—Mulgrave Woods. On tree stump, F.F., 1912, 'Nat.' p. 28.

'*Pileus conico-campanulate, even, dry, glabrous, livid or dingy pallid; gills emarginato-decurrent; crowded, white, or very slightly tinged rose; stem fragile, polished, even, glabrous, base curved, rooting.*'—Mass. Eur. Agar. p. 40. (To follow 225).

Very near to *Mycena galericulata*, differing in being fragile and in becoming pale.

INOCYBE VIOLACEIFOLIA Peck. 'Nat.' p. 24.

NAUCORIA AMARASCENS Quel.

* The number indicates its place in the 'Yorkshire Fungus Flora.'

S.W.—Luddenden Dean, near Halifax. Among grass. September, 1912, 'Nat. Hist. Sec., Halifax Sci. Soc.'

'*Pileus slightly rugulose, brown then tan; gills uncinato-ventricose, whitish then tawny; stem striate, whitish saffron then umber; spores 10 μ long.*'—'Mass. Eur. Agar.' p. 164. (To follow 488).

AGARICUS BERNARDII Quel. 'Nat.' p. 24-25.

HYGRÖPHORUS PERSICINUS Beck. 'Nat.' p. 24.

PANUS FARINACEUS Schum, p. 365; Fr. Hym. Eur. p. 490.

N.E.—Mulgrave Woods. On dead branch, F.F., 1912.

TYPE.—So far as we can learn, the variety only of this species—var. *albido-tomentoso* Cke. and Mass., has previously been found in Britain. The variety has been met with in Epping Forest, and at the Barnsley (Yorkshire) Fungus Foray, 1897. 'Nat.' p. 28.

CORTICIUM CONFINE Bourd, Galz. (Bull. Soc. Myc. France 1911, p. 261.

N.E.—Mulgrave Woods. On very soft rotting wood. 'Nat.' p. 28.

'*Thin, irregularly effused, at first pure white and arachnoid, hymenium finally deep cream colour. Hymenium not continuous but consisting of closely crowded granules or flocci, giving the plant the appearance of a Grandinia to the naked eye; margin pure white, byssoid; basal hyphae 2-4 μ ; often inflated at the septa with clamp connections; basidia 3-5 μ wide; spores subglobose, base pointed, 3-4 \times 2-3 μ usually with one oil-drop.*' (To follow 1162).

TOMENTELLA FERRUGINEA Schroet. (in Crypt. Flo. von. Schles I., p. 419).

N.E.—Mulgrave Woods. On decaying wood, bark, etc. 'Nat.' Jany., 1913, p. 28.

'*Effused, thin, loosely felted, deep rust-brown. Basal hyphae creeping, dark brown with a purple tinge, 5-8 μ wide septa with clamp connections; basidia and subhymenial hyphae yellow-brown, basidia 10 μ wide, sterigma 4, curved, 8-9 μ long \times 1.5-2 μ at base; spores bright yellow-brown, globose, 8-10 μ diam. with numerous hyaline spines.*' [To precede 1210].

DIAPORTHE (TETRASTAGA) INSIGNIS Fckl. Symb. Myc. App. II., Tab. 36.

N.E.—Mulgrave Woods. On Rubus fruticosus. 'Nat.' January, 1913, p. 27.

'*Stromata effused, black or blackish-brown, circumscribed by a black line within, often confluent and covering the whole branch; perithecia fairly large; ostiola cylindrical, more or less emergent; spores broadly fusiform, slightly curved, 4-guttulate, not constricted, ends obtuse, 12 \times 4-5 μ .*'

Description after Winter. Sir H. C. Hawley, who examined the specimens remarks:—'My spore measurements differ

slightly— $12-13 \times 3.5-4\mu$ (occasionally up to $16 \times 4.5\mu$) slightly constricted.' [To follow 1560].

MELANOMMA (TREMATOSPHERIA) PARADOXA Winter.

N.E.—Mulgrave Woods. On oak wood. 'Nat.' January, 1913, p. 27.

'*Perithecia emergent, almost superficial, zoned with small, distinct ostiola, smooth; asci narrowly clavate, $90-100 \times 9-10\mu$; spores clongato-fusiform, one end much narrowed, 5-10 septate, not constricted, hyaline, $18-35 \times 3.5\mu$.*

Winter says in his type specimens the spores are not truly septate, but probably become so. Mine were multiguttulate, then with contents pseudo-septate. (Sir H. C. H.). [To follow 1618].

BELONIDIUM PUNCTUM (Rehm.) Rabhen. Krypt. Flo. Ascom. p. 569; *Niptera Punctum*, Sacc. Syll. VIII. p. 485.

N.E.—Broxa Moor, near Scarborough. On dead, dry leaves of *Nardus stricta*. T. B. Roe, Scarborough, July, 1912.

'*Minute, at first punctiform, globose, then sub-hemispherical, sessile, attached by a broad base; disc concave, brown when moist, margin raised, blackish when dry, $\frac{1}{4}-\frac{1}{3}$ mm. diam.; excipulum minutely parenchymatous, brown, cells gradually clongating and narrowing towards the greenish-brown margin; asci clavate, 8 spored, $55-60 \times 10-12\mu$; spores hyaline, irregularly bi-seriate, oblong, straight or slightly curved, binucleate, 2-celled, $15-18 \times 4.4-5\mu$; paraphyses slender, apex slightly swollen, brownish.*' [To follow 1996].

SPOROTRICHUM ROSEUM Link, Obs. I., 33; Sacc. Syl. IV., p. 106; Fung. Ital. f. 747.

S.W.—On rotting printed paper in damp cellar, Leeds. J. W. Taylor and W. D. Roebuck, December, 1911.

'*Tufts effused, rosy, sometimes confluent; hyphae creeping, pale rose, vaguely branched, sparingly septate, here and there producing simple or bi-tri-fid branchlets; conidia apical, ovoid, $4 \times 3\mu$, uniguttulate, rosy.* On damp paper, walls, earthenware jars, bladders, etc., in France, Belgium, Germany and Italy.' Sacc. Syl. IV.

The Leeds specimens differ slightly from the above description in being more of an ochraceous-rosy tint, and conidia $3.4 \times 2.2-5\mu$ [To precede 2332].

TRICHOSPORIUM CHARTARUM Sacc. Rev. Myc. 1885 p. 224; Syl. Fung. IV., p. 294 (= *Sporotrichum chartaceum* Pers. Myc. Eur. I., 83).

S.W.—On damp wall-paper, Mixenden, near Halifax, June, 1911; on rotting printed paper in damp cellar, Leeds. J. W. Taylor and W. D. Roebuck, December, 1911.

'*Powdery, spots suborbicular, then confluent; hyphae vaguely branched; conidia ellipsoid, $5-6 \times 4\mu$, olivaceo-fuscus.* On damp, rotting paper, France, Germany, Italy.'

The following description was taken from the Leeds and Halifax specimens:—*Hyphæ* brown 2.5-3 μ thick, irregularly branched, ultimate branches at right angles, tips paler, slightly swollen and minutely asperate, conidia subglobose, smaller than type, 3.4.5 \times 2.5-3.5 μ , brown. At first in tiny tufts a line across, spreading to patches $\frac{1}{4}$ - $\frac{1}{2}$ inch, often confluent.

This species was first recorded as British, in Journal of Botany, February, 1912, p. 44, by W. B. Grove, as growing on damp brown paper, Birmingham, May, 1911. [To precede 2378].

NEW TO YORKSHIRE.

Twenty-two of the following forty species were all found, for the first time in Yorkshire, in Mulgrave Woods, in either Spring or Autumn, 1912, and are included in the bald lists of additions, 'Nat.', January, pp. 27-8. This note and arrangement is intended to save repetition of locality. The additions for other parts of the county follow.

MYCENA RUBROMARGINATA Fr.

Among rotting twigs. [To follow 210].

MYCENA COLLARIATA Fr.

In woodland among scanty grass. [To follow 248].

INOCYBE SINDONIA Fr.

In woodland among grass. [To precede 446].

NAUCORIA TRISCOPODA Fr. [To follow 486].

PORIA HYMENOCYSTIS B. and Br.

On decaying wood. [To follow 1077].

CORTICIUM LACTESCENS Berk.

On decorticated branches. [To precede 1163].

CORTICIUM LAEVE (Pers). *Thelephora laevis* Pers. Syn. Meth. Fung. 1801, p. 575.

On decaying wood. [To precede 1164].

The first Yorkshire record under this name. Berkeley, Cooke, and Stevenson each say in their works on British Fungi that *C. laevis* is common. This name is not included in Masee's Mon. Thelephoreae Jour. Lin. Soc., nor in this author's Thelephoreae, Brit. Fung., but finds a place in his British Fungi (1911).

FEMSJONSIA LUTEO-ALBA Fr.

On fallen dead branches. [To precede 1261].

DIALONECTRIA (CALONECTRIA) PLOWRIGHTIANA Sacc.

On dead stems of *Arctium Lappa*. [To follow 1463].

DIATRYPE CRUSTOSA Sacc. et Roum.

On holly. To precede [1564].

PSILOSPHAERIA (Melanopsamma) POMIFORMIS (Pers.)

On dead branches and wood. [To precede 1595].

STRICKERIA OBDUCENS (Fr.) Wint.

On dead wood. [To follow 1602].

AMPHISPHAERIA UMBRINA (Fr.) De Not.

On dead oak wood. [To precede 1619].

GNOMONIA CERASTIS Reis.

On petioles and blades of sycamore leaves. [To precede 1632].

PHYSALOSPORA (Ditopella) FUSIPORA Cke. Syn. Pyr. p. 76.
(=*Ditopella fusipora* De Not. Sacc. Syl.; *D. ditopa* (Fr.) Schroet.).

On alder. [To follow 1635].

HYSTERIUM ANGUSTATUM (Fr.). A. and S.

On birch bark. [To follow 1716].

MITRULA VIRIDE (Pers.) Karst.

On bare sloping ground under beech tree. [To follow 1743].

KARSKIA LIGNYOTA (Fr.) Sacc. (= *K. nigrescens* Rehm.
Asc. n. 21; *Arthonia melaspermella* Nyl. Flo., 1865, p. 605;
Leighton Brit. Lich., Flo. p. 416.

On decorticated wood. [To precede 2117].

CLASTEROSPORIUM OPACUM Sacc.

On dead wood. [To precede 2403].

GRAPHIUM GROVEI Sacc.

On bit of fallen decorticated branch. [To follow 2453].

PHYSARUM STRAMINIPES Lister. Jour. Bot. XXXVI., 163,
t. 386, fig. 2 (1898). ; Myct. 2nd. Ed. p. 64. pl. 42 (1911).

On rotting wood. Typical in every respect. [To precede 2563].

BADHAMIA POPULINA Lister. Jour. Bot., XLII., 129 (1904) ;
Myct. 2nd. Ed. p. 32, pl. 2 (1911).

On pieces of decaying *Populus* wood. [To precede 2568].

A rosy tinted specimen. 'Except for this rosy tint the sporangia and spores are typical. Dr. Sturgis (Colorado) has often found this species in Colorado, varying in colour from white to cream, but your gathering throws new light on the variation we may look for in *B. populina*. Have as yet received this from only a few parts of England.'—(Miss G. Lister).

MYCENA PLICATOCRENATA Fr.

N.E.—On rotting larch-twigs among moss, near Robin Hood's Bay. November 26th, 1912. Miss Cooper, Fylingdales Vicarage. [To follow 259.]

HEBELOMA SUBCOLLARIATA B. and Br.

S.W.—On waste ground, Carr Pit, near Huddersfield. September, 1912. A. Clarke.

About forty specimens in various stages of growth were found within a few square yards. [To follow 538.]

POLYPORUS FIBULA Fr. (?)

S.W.—On under surface of old beam, cartshed, near Hebden Bridge. May, 1911. J. Needham.

Mr. C. G. Lloyd considers this may be *P. fibula*, but queries it. [To follow 1039].

FOMES LACCATUS.

N.E.—Scarborough. A. E. Peck. Brought to the Mycological Meeting, Sandsend, May 1912. [To follow 1049.]

CORTICIUM EVOLVENS Fr.

S.W.—On bark, near Leeds. H. Wager. March 1912. The same thing was found at Mulgrave in May. [To precede 1156.]

It is possible that this may be another name for *C. lævis*.

UROMYCES ANTHYLLIDIS (Grev.).

N.E.—South Cliff, Scarborough. *Uredospores* on *Anthyllis Vulneraria*. June 21st, 1912. T. B. Roe. [To precede 1310.]

GYMNOSPORANGIUM CONFUSUM Plow.

N.W.—Sedbergh. *Æcidiospores* on *Cratægus Oxyacantha*. June 1912.

'This species has been very destructive in the cemetery at Sedbergh, nearly all the fine *Cratægus* bushes have been seriously injured. They have now removed all the junipers bearing the *Teleutospore* stage.' (G. Masee.)

LOPHODERMIIUM MELALEUCUM De Not.

N.E.—Scarborough, on dead leaves of *Vaccinium Vitis Idæa*. T. B. Roe. [To follow 1707.]

L. MACULARE (Fr.) De Not. Type.

Mid. W.—Austwick Bog, near Clapham, on bleached leaves of *Vaccinium Oxycoccus*. July 1912. M. Malone, Bradford. [To come under 1707.]

DASYSCYPHA DIMINUTA (Rob.) Sacc.

N.E.—Staintondale, near Scarborough, on dead juncus-stems. March 1912. A. E. Peck. [To precede 1883.]

ROESLERIA PALLIDA (Pers.) Sacc.

N.E.—See *Nat.*, April 1912, p. 120.

ISARIA UMBRINA.

S.E.—Selby. On bark, growing with young *Hypoxylon coccineum*, of which it is the conidial stage. June 1912. W. N. Cheesman. [To follow 2444.]

LICEA PUSILLA Schrad (= *Protodermium pusillum* Rost.).

Mid. W.—Buckden. On rotting wood. Nov. 1912. E. A. Cheetham and A. R. Sanderson. [To follow 2487.]

STEMONITIS FLAVOGENITA Jahn. F.F., September-October, 1912.

N.E.—Mulgrave Woods, on decaying stumps. This may possibly be the same species registered under the name of *S. ferruginæa* gathered at the Mulgrave Meeting held in 1900.

S.W. Under Hathershelf Scout, Sowerby, near Halifax; on rotting stump, Luddenden. July 1912. H. Walsh. Plasmodium, lemon or citron yellow.

COMATRICHA ELEGANS Lister, Mon. Mycet., 2nd ed. (1911) 155 (= *Raciborskia elegans* Berl., Sacc. Syll. VII., 400 (1888);

Mass. Mon., p. 108; List. Myct. (1894), 133; *Rostofinskia elegans* Racib. (1884).

S.E.—On rotting wood, Riccall, near Selby. Y.N.U. Exc., May 1912. Per W.N. Cheesman; Certe, Miss G. Lister. [To follow 2503.]

DIANEMA CORTICATUM Lister, Myct. 205 (1894); List., Mon. Myc., 2nd ed. (1911), 259.

Mid.W.—Buckden, on decorticated wood, Nov., 1912. Cheetham and Sanderson. [To precede 2514.]

LACHNOBOLUS INCARNATUS Schroet. Kr. Fl. Schles. 110 (1885); Mass. Mon. 128 (= *L. congestus* Somm. Flo. Lap. (1826), 241; List. Mon. Myct. (1911), 246, etc., etc.

S.W.—Hathershelf Scout, Sowerby, near Halifax. On decayed tree-stump. H. Walsh, Luddenden. [To follow 2518.]

ARCYRIA STIPATA Lister, Myct. 189 (1894); List. Mon. 243 (1911).

S.E.—Stainer Wood, near Selby. April 1912. W. N. Cheesman; Certe, Miss G. Lister. [To follow 2521.]

ADDITIONAL HABITAT OR HOST.

DAEDALEA QUERCINA. A most interesting, abnormal form was sent me on March 27th, 1912, by Mr. E. W. Wade, President of the Hull Scientific and Field Naturalists' Club. The specimen was found growing in the interior of an old barge at Hull. The dissepiments are much thinner than those of a type specimen, perhaps the unusual habitat was responsible for that. It had been most carefully detached from the side of the wood, and is now deposited at Kew. The home of *D. quercina* is on newish oak stumps.

PUCCINIA SONCHI. On *Sonchus oleraceus*. Hackness, near Scarborough. July 30th, 1912. T. B. Roe.

PLEOSPORA LEGUMINUM. The only habitats recorded for this species in Yorkshire up to August, 1911, were Scarborough, on *Lathyrus pratensis*. In that year and month Mr. T. B. Roe sent me from the same locality specimens on dead leaves of *Anthyllis Vulneraria*, and on 16th February, 1913, on decaying pod of *Sarothamnus Scoparius*.

TAPHRINA AUREA (Y.F.Flo., p. 310). On white poplar leaves, Scarborough, 1910. Miss Hibbert-Ware, Com. T. B. Roe. Feb. 16th, 1913.

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The **Reading Museum** has just issued a fifth edition of its well illustrated guide to the Roman remains from Silchester.

The reports of the Curator of the **Hastings Museum** for the two years ended 31st December, 1912, records the loan of the egg of a Great Auk.

1913 April 1.

NORTHERN NEWS.

George Baker, who 'was half a century ago one of the keenest and best of our British Lepidopterists' died recently in Germany.

Mr. A. Harker, F.R.S., will represent the Cambridge University at the Twelfth International Geological Congress to be held in Canada in August.

The Balance Sheet recently issued by the Manchester Geological and Mining Society shows that there is a 'balance in favour of the society' of £1,837 10s. 3d.

At the forthcoming meeting of the British Association at Birmingham, Professor E. J. Garwood will preside at the Geological Section; Dr. H. F. Gadow, at the Zoological, and Miss Ethel Sargent, at the Botanical Section.

At the recent Anniversary Meeting of the Geological Society, the following awards were made:—The Wollaston Medal to the Rev. O. Fisher; the Murchison Medal to Mr. G. Barrow; the Lyell Medal to Mr. S. S. Buckman and the Bigsby Medal to Sir Thomas Holland.

We notice in a contribution to a 'natural history' journal that 'Naturalists who write books arrange birds in many different ways; but, if the arrangement were left to me, I should put our British birds in an order which has, I think, never been used before, because I should place the great tit first.' *If!*

Over two thousand fragments of carved stone from St. Mary's Abbey, York, and other sites in that ancient city, have been placed in the large room under the new lecture theatre at the Museum there. The collection is very creditable to all who have worked so hard in gathering the pieces of sculpture together.

We much regret to learn of the death of Mr. E. Mitchell, of Leeds, which took place recently. For many years Mr. Mitchell regularly attended the meetings and excursions of the Yorkshire Naturalists' Union, and took a great interest in its welfare. Geology was perhaps his favourite subject. He was 68 years of age.

In a letter to the press a well-known Yorkshire ornithologist refers to 'the unnecessary multiplication of sub-species, each with a formidable Latin name, and with the name of the *spitter* tacked on to it.' Is this still another new name, or is it merely that the printer has omitted a letter which makes a '1' of a difference?

There is nothing like modesty. We learn from an author's advertisement of a forthcoming book on Entomology, which is 'finished at last,' that 'This work is what every collector has wanted. . . . Index perfection, . . . is right up to date, and . . . will prove the most valuable work ever issued. [!] . . . I can thoroughly recommend it.'

A well-known Yorkshire Ornithologist recently visited a Yorkshire moor in order to see a pair of strange birds which were nesting. These had been described by the keeper in a wonderful way, and one of the features was a 'red wedge-shaped tail.' Investigation proved the birds to be redshanks, and the 'red wedge-shaped tail' was 'the legs of the bird sticking straight out.'

From the Fourth Report on the condition of the Bardney Abbey excavations, with accounts for the year 1912, it is apparent that the excellent work being carried on at this site shows no sign of abatement. Indeed we learn that 'a great quantity of beautiful carved stone has been unearthed; the best of it has been put into the museum with the result that the floor has given way.'

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THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY
T. SHEPPARD, F.G.S., F.R.G.S., F.S.A.Scot.,
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AND
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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S.
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T. H. NELSON, M.B.O.U., WILLIAM WEST, F.L.S.,
RILEY FORTUNE, F.Z.S.

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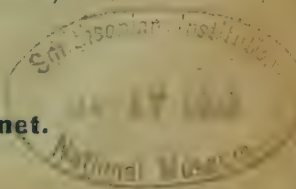
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NOTES AND COMMENTS.

DOMINANCY IN NATURE.

'Dominancy in Nature, and its Correlation with Evolution, Phylogeny, and Geographical Distribution, by John W. Taylor, embodies Mr. Taylor's Presidential Address to the Yorkshire Naturalists' Union at their Fifty-first Annual Meeting. It is a successful attempt to sketch the great movements in Nature, as to the distribution of species. As in the case of man we find the more highly developed races arising and pressing back the weaker and less advanced types, so, Mr. Taylor ably shows, this principle of dominancy prevails in every realm of life, and from mammal, bird, insect, and plant he draws the same lesson: that the stronger is constantly thrusting back the feebler, and that even the fungus works on the motto adopted by Rob Roy:—

'That they shall take who have the power,
And they shall keep who can.'

No publisher's name appears to be given.' So says the *Yorkshire Post*, so that evidently the address has been published, though so far we have not had the pleasure of seeing a copy.

THE MUSEUMS ASSOCIATION.

The Annual Conference of the Museums Association will be held at Hull, on the invitation of the Mayor and Corporation, during the week commencing July 14th, under the presidency of Mr. E. Howarth. From the preliminary programme which has been issued, it seems that three sessions are to be devoted to the reading and discussion of papers; visits are to be paid to the Natural History Museum, the Wilberforce Historical Museum and the Museum of Fisheries and Shipping. There are to be excursions to Bridlington and Flamborough, to Burton Constable, and to Spurn by steamer. The social side of the meeting is also well catered for.

THE BEGINNINGS OF GEOLOGY.

It is interesting now and again to look back upon the beginnings of things, and while a century ago can hardly be looked upon as the actual beginning of the science of geology, it was about that time that William Smith laid the foundation stones of the science as we now know it. The following quaint extracts relating to early Yorkshire Geology are taken from the Yorkshire volume of "The Beauties of England and Wales," and are from the pen of John Bigland, whose book shows that he was particularly well informed on many subjects.

FOSSIL MEN.

'The neighbourhood of Whitby abounds with natural curiosities; and the various petrifications almost everywhere found in the alum rocks, have long excited wonder, and puzzled philosophy. Besides the petrified shells of sea-fish, etc. . . . some others have been found in the scarr, or cliff, on the east side of the mouth of the Eske, which cannot be arranged under any class. In the early part of the last [XVIIIth] century, Dr. Woodward dug up on the scarr the petrified arm and hand of a man, in which all the bones and joints were perfectly visible, and seemed regularly formed with cavities for the marrow. About the year 1743, the Rev. Mr. Borwick found in the alum-rock the complete skeleton, or petrified bones of a man; but although the utmost caution was used in digging it up, it was broken into several pieces, and greatly mutilated; in that condition, however, it was sent to one of our universities as a great curiosity.'

A CROCODILE AND A HORSE.

'After this, in the year 1758, the petrified bones of a crocodile, an animal never known in this part of the world, were taken out of the rock; and these, though broken into many pieces, were sent up to the Royal Society, of which a particular account may be seen in the Philosophical Transactions, Vol. L. Part II. And about four years afterwards, the skeleton, or petrified bones of a horse, were found in the alum works at Saltwick, at the depth of about thirty yards under ground, which were taken up with much care, though not without being considerably broken, and sent as a natural rarity to the university of Aberdeen.'

SNAKESTONES

'Among the curiosities which abound on this part of the coast, are the ammonitæ, or snake stones, found in almost every place where the alum-rock exists, and particularly in Whitby scarr, between high-water and low-water mark. This scarr or rock is formed by a stratum of alum-mine, nearly on a level with the surface of the ocean; and the snakes are all inclosed in hard elliptical stones, which seem to have been stuck therein, being coiled up in spiral volutes, and everywhere resembling that animal in their form and shape, save only in the head, which is always wanting. They are of *two different species* [!], some of them being round-bodied fluted, or infulated, while others are flat-bodied, ridged on their backs, and pitted on their sides.'

OF TWO SPECIES.

'The round-bodied snakes are girt, or encompassed from end to end with semi-circular channels, or cavities, the appear-

ance of which is just the reverse to that of a cask, bound about with wooden hoops contiguous to each other; for the hoops are convex, or raised above the body of the cask, whereas these rings are concave, or let into the body of the snake. The other species of snakes have a ridge on their backs, and are flatted on the sides, as if they had been pressed together; the marks wherewith they are pitted or indented resembling the impression made by a man's thumb on a soft substance. The stones wherein these snakes are inclosed must be broken very carefully, otherwise the snake will break also.'

INTERNAL STRUCTURE.

'The impression which the snake leaves on its bed, or nidus, within the stone, is very perfect and beautiful. Sometimes the body of the snake is powdered with shining specks, and sometimes it is of a bright yellow colour, as if it were gilt. The snake seems to be a different mineral from the stone in which it is inclosed; and when broken, its substance within resembles salt-petre in colour, transparency, and hardness. These snakes are of various sizes, the spiral convolutions being from one to six sinches in diameter; the flatted snakes are the largest; but the round-bodied infulated snakes are not only the most numerous, but also the most beautiful. These ammonitæ are noticed by Camden, Leland, and others; and both of them observe, that fame ascribes them to the power of St. Hilda's prayers.'

SPORTS OF NATURE.

'Mr. Charlton says, that it is yet a constant tradition among the vulgar in that part of the country, that these were real snakes, with which Whitby and its vicinity were infested, and which being driven over the cliff by Lady Hilda, and losing their heads by the fall, were afterwards, by her prayers, transformed into stones. Such is the credulity and superstition of the multitude; it is needless to say, that these monkish miracles and absurd legends are treated with contempt by all persons of an enlightened understanding. The historian of Whitby adopts the opinion of Dr. Lister, Camerarius, and others, who suppose all the petrifications resembling shell-fish, or other animals, found in rocks, or on mountains, etc., to be a mere '*lusus naturæ*,' or '*lapides sui generis*,' produced by fermentation, or by some peculiar property inherent in all aluminous; and he opposes the hypothesis of those who imagine that they have once been living creatures, and been brought into their present situation by some violent convulsion of the earth, either at the time of the deluge or at some other period, grounding his arguments on the regularity of the strata near the surface.'

NO CHANGE SINCE CREATION.

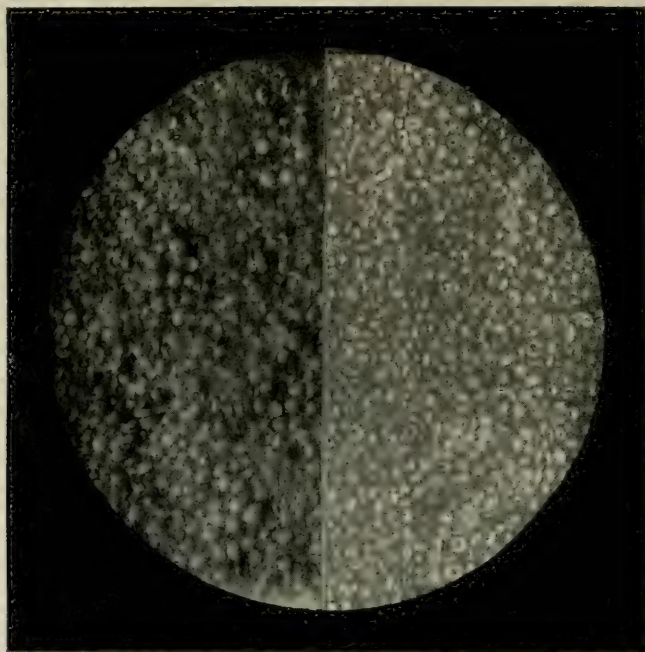
'His observations on this curious subject may not be disagreeable to the reader:—'Let any one,' says Mr. Charlton, 'survey our cliffs, and he will soon perceive that there is the most exact symmetry and order to be traced through the several strata, and that they adhere together in a more regular, even, and orderly manner, than they could ever have been placed by the hand of man; in short, that the whole fabric has in it the marks and characters of an Almighty Architect, where nothing has undergone any considerable change since its first creation, though the heaviest strata are not always found at the greatest depth; for above the alum-mine we meet with a solid body of iron-stone, much heavier than alum-rock; and above that is a stratum of doggers, still heavier than the ironstone, above which is a thick bed of marl or earth, and that is covered with a heavy bed or quarry of freestone, over which is found several different strata or marl or earth, till we come at the surface.'

'A CHIMERA.'

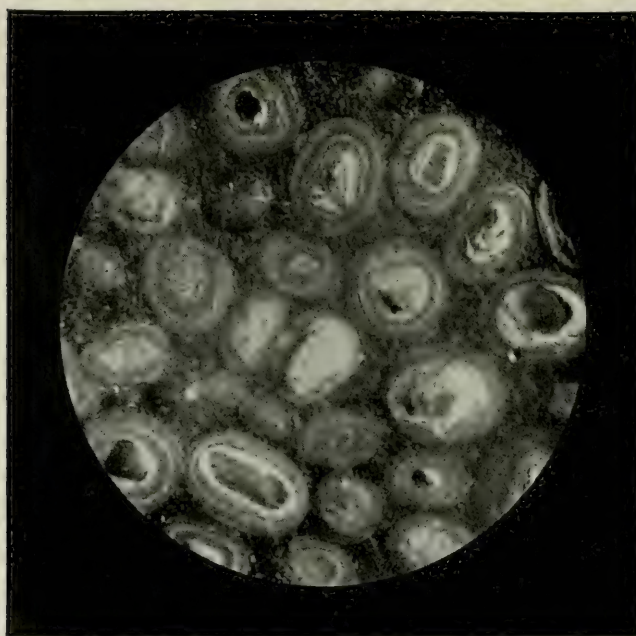
'The floor of a room cannot be more evenly and exactly laid by the hand of the most skilful joiner or carpenter, than these several strata are placed one above another, while all of them are connected together with the utmost regularity and order. What signs or marks then do they bear in them of a deluge? Or how can we suppose them ever to have been so much convulsed as to admit animals and large pieces of timber under them? The whole of this is certainly a chimera, and must be treated as such by every intelligent person who carefully views them. Perfect resemblances of those very cockle-shells, before mentioned, are to be found within the hardest flints under our cliff, in several of which some hundreds of them are to be seen; but though very curiously formed, they still preserve the colour of the stone to which they belong, and cannot be supposed by any one ever to have been bodies of living animals, distinct and separate from that stone.' These observations of Mr. Charlton are certainly worthy of notice, although his arguments can scarcely be considered as decisive in regard to this curious question, which has exercised so many learned pens, and given rise to so many ingenious speculations.'

—:o:—

The following seems to be 'the limit' as regards advertising a Nature Study book:—"The Way to Health is to know the Laws of Nature, and obey them. The way to know the laws of nature is to read ——. The way to get —— is to send Five Shillings to the Office, ——, and it will be delivered at your door every month for a year. ENTERTAINING READING! BEAUTIFUL PICTURES!! NO NONSENSE!!!" The last words, with the necessary three notes of exclamation, are not italicised by us, but so appear in the advertisement!



No. 1.—Top bed, Liverton Ironstone.
Fractured surface (dark) on left; polished surface on right. Magnified 5 diameters.



No. 2.—Top bed, Liverton Ironstone.
Polished surface; oblique illumination. Magnified 30 diameters.

THE CLEVELAND IRONSTONE.

J. J. BURTON, F.G.S.

(PLATES VIII., IX. AND X.).

(Continued from page 168).

In some cases the accompanying diagrams are based on the Geological Survey measurements, in others the Survey records have been corrected in the light of more recent observations, and in several instances they are the result of information given to me by mines' managers, or recently taken by myself.

In the section of the main seam of ironstone at Eston (*A*), the Main and Pecten seams, although divided by a line, are continuous in section, that is, there is no shale parting between them; but in the section to the east, at Court Green (*B*) less than two miles away, these two seams have become separated by a band of Dogger and a band of shale. In an eastward direction, as depicted on successive diagrams, the shale band thickens, not on any very clearly defined principle, but in a somewhat irregular manner, until finally the Pecten seam becomes so split up into thin bands of shale and ferruginous material that it is impossible to define its upper and lower boundaries with any certainty.

Without dealing with the subject in any commercial sense it is noteworthy that just where the Ironstone seam was first opened out on an industrial scale, the bed is not merely the thickest and the richest in iron, but the Pecten bed really forms part of it and was worked along with it. This cannot be done anywhere else in Cleveland.

On the map is an irregular line commencing at Eston (marked *A*), and ending at Hawsker (*H*). Between these two points all the sections on the first portion of the diagram were taken, and the positions of the several sections are indicated by letters corresponding with those heading the columns on the diagram.

On the map is also shown a line beginning at the same point (*A*), and proceeding in a southerly direction to Ingleby (*J*), and thence in a direction west-south-west to Swainby.

Intersecting the southern line at Roseberry (*I*), is another line more or less easterly to *L*₂ and thence north-easterly until it cuts the line from Eston at Staithes (*F*) thus forming an irregular triangle. The position on the map of the different sections shown on all the diagrams is indicated by corresponding letters.

It has been shown that the ironstone thins out and becomes split up along the most northern line. Taking the base of the triangle, starting at Eston (*A*), Roseberry Topping is

shown $3\frac{1}{2}$ miles distant. In that short distance there has been a great alteration in the strata. The main seam has thinned down from 11 feet to $5\frac{1}{2}$ feet. The Pecten seam closely resembles that at Hummersea, which is nearly 11 miles distant from Eston. Any differences may be due to the difference in the mental attitude of different observers, in allotting this to Ironstone, that to shale, or to the difficulties attending accurate measurement. Still proceeding southwards to Ingleby (a distance of $5\frac{3}{4}$ miles from Roseberry), the Pecten seam (if correctly located and described, and I am taking the figures from the Survey records) bears no kind of relationship to the section which I have had taken at Roseberry, and is very puzzling and difficult to explain. Some other measurements and observations which I have recently made between the two points, while not explaining, appear to throw some light on the subject.

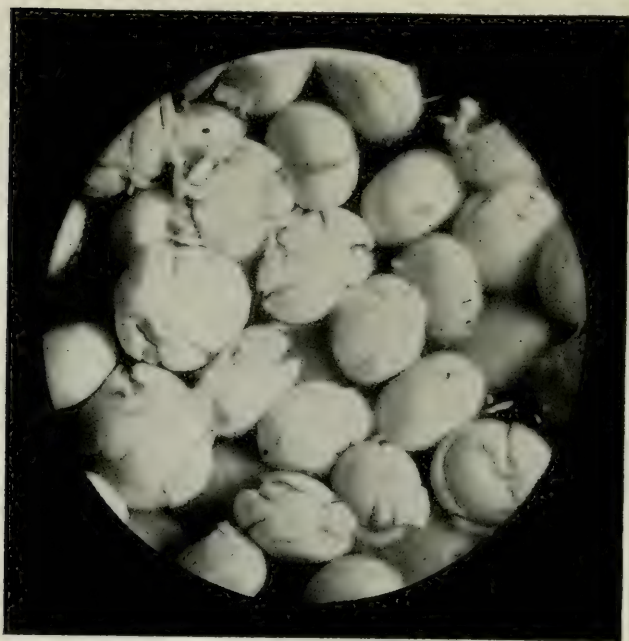
At Cockshaw, about $1\frac{3}{4}$ miles south of Roseberry, the Pecten bed has become nearly all shale, with only two thin bands of ironstone; below it is a band of 3 ft. 2 in. of shale. At Roseberry this same shale bed is split into two, differing quite distinctly from each other; or, as the section is not at present very easy to explore, should it turn out that any of the shales above or below the two thin bands of ironstone at Cockshaw belong to the Pecten, then the difference between Roseberry and Cockshaw is, if anything, still more marked. Inside the mine at Roseberry, close to a fault, the whole character of the Pecten bed becomes altered; there are three thin bands of shale amounting in total thickness to only eight inches, and the ironstone bands have a total thickness of 3 ft. $3\frac{1}{2}$ ins. Local variations evidently occur, shewing that the conditions existing at the time the strata were being formed must have been variable. Perhaps in this instance faulting and deposition and possibly denudation were progressing simultaneously, but the main point is that in distinctly local areas there are given variations in the character of the beds.

Along the most southerly line of sections there are numerous local changes, but broadly speaking the ironstone in the main seam becomes less rich in iron and the impurities, chiefly silica and alumina, become more pronounced as we proceed eastward. Along with this change there comes the cleaving of the ironstone into a top and bottom block, with a band of Dogger or shale between them, and just as in the converging line of sections on the coast, the band of shale thickens towards the east.

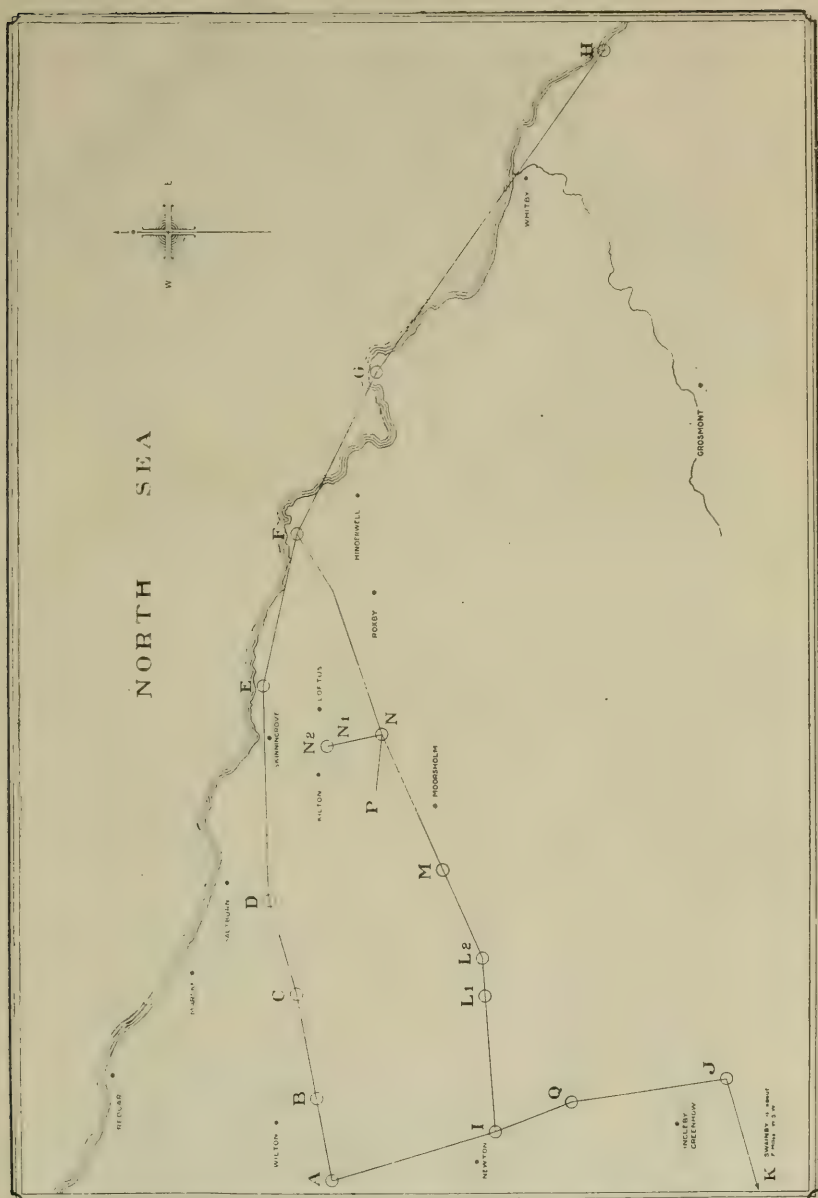
Some of the local variations are curious. Thus in Spawood Mine, the Western side of the most southerly workings (*L*) shews a thicker band of shale and a thinner bottom block of ironstone than the eastern side (*L2*) 1,300 yards along the line



No. 3.—Top bed, Liverton Ironstone.
Oolitic grains; insoluble portion left on boiling with strong Hydrochloric acid.
Magnified 30 diameters.



No. 4.—Top bed, Liverton Ironstone.
Same as No. 3, after crushing. Note the grain at right hand lower corner in which the Oolitic layer has fallen off, leaving a second layer exposed.
Magnified 30 diameters.



Map of the Cleveland Area, showing the positions of the Sections.

of section, which is entirely contrary to what might be expected judging from experience elsewhere. Again, in the case of Stanghow (*M*) the bottom block of ironstone is lithologically so much like the middle band that it is difficult to distinguish the one from the other as they appear in the seam.

I have drawn a subsidiary line of sections from Liverton Shaft (*N*₂) for 1½ miles South to *N*. The rapid alteration in the main seam along this line is remarkable. Thus the two feet of the middle dogger, which was very ferruginous, and was worked with the stone, at the shaft becomes split into 1 ft. 2 in of shale and 10 in. of dogger, 638 yards to the south, and is a very silicious shale 1½ miles from the shaft.

From this last point is a line due west to the present position of the workings in Kilton pit, and the mines manager kindly gives me the section (*P*) which gives the middle band as

Dogger	9 in.
Shale 1 ft.	8 in.
Dogger	8 in.

3 ft. 1 in.

but doubtless the dogger is sufficiently ferruginous to be worked as an ironstone.

When I first began to prepare these sections I had the expectation that I should be able to discover some general principle which would sufficiently explain the variations in thickness, quality, and nature of the deposit, but in this I have quite failed, as there are so many and such striking local exceptions to the rule which would seem to generally apply, that any deductions are now necessarily put forward tentatively and with diffidence.

If in the comparatively few sections which are obtainable inland, there are such unexplained differences; what may there not be in places yet to be opened up? Almost every writer since Bewick's time has drawn his conclusions from such premises as were available at the time, and generalized from limited areas of investigation; and each succeeding writer on the same subject has found it necessary to modify some of his predecessors' statements. One of the most cautious and reliable of men — the late C. Fox Strangways, made the same error when he said of the changes in the character of the main seam, 'These changes are so extremely regular that the thickness of the ironstone at any point may be calculated from the nearest known sections.' This is not quite borne out by facts, and therefore any opinions now expressed are merely based on a careful consideration of present knowledge. It does, however, seem from the evidence, even including the absence of regularity, that there is justification for the opinion

Naturalist,

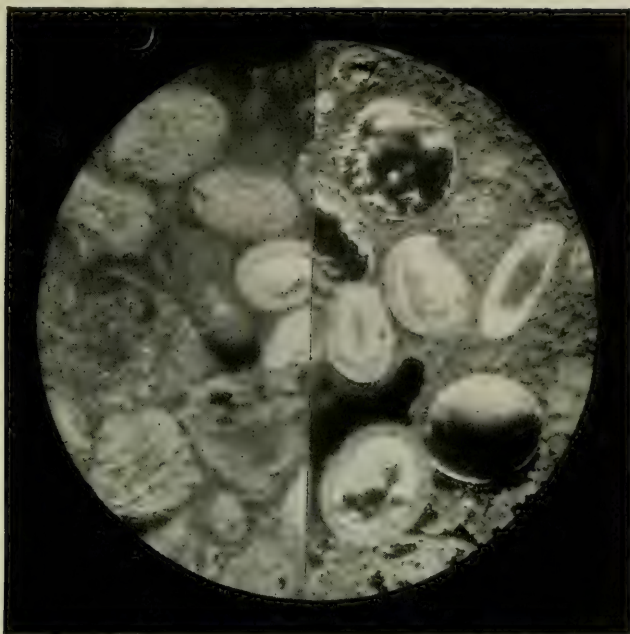
that the original deposit did not, if at all, extend westward much beyond the present escarpment. There must have been during the Middle Lias period much oscillation of land and sea levels and alternate encroachments, one on the other. As sometimes in mining there is found an entire "wash-out," and as some of the thinner seams are in places entirely absent, it seems clear that there were many shifting currents sometimes preventing deposits, and at other times removing those which had already been laid down. It seems probable that in the shallow waters of the period there were mud banks which were partly dry land, and that while deposits were being laid down elsewhere, there were no accumulations in such areas until some further change in level, or a fresh direction of current took place.

The detritus-bearing streams apparently came from the north-west, and there is room for the assumption that the black shales which so characteristically distinguish the Yorkshire Lias are the products of denuded coal measures of the West, and that such differences and interruptions in formation, as well as changes from shale to limestone as they undoubtedly reveal, are due to earth movements having changed the flow of the streams in the gathering grounds, the subject of denuding action.

The area over which the ironstone seams extend, and the quantity of stone known to exist therein, is not much guide to economic values. But here again one must speak with caution, as mines which have been abandoned within the last 50 years because the stone was too poor in quality to be worth working, are now being worked profitably. The conditions of iron manufacture, the development of improved methods, the opening out of new supplies in foreign countries, the freight market, state regulation of bounties and tariffs, the contiguity of fuel and flux, all have an important bearing upon what Cleveland ore may or may not be possible to use. But the probability is that most of the workable stone in Cleveland lies within the area *A, I, F*, on the map. The northern outcrop of the main seam is on the coast east of Saltburn. From there the outcrop is by the Western escarpment round to the Kildale Valley; but the stone lying to the south of the line *I, L, F*, is poor in iron and high in impurities.

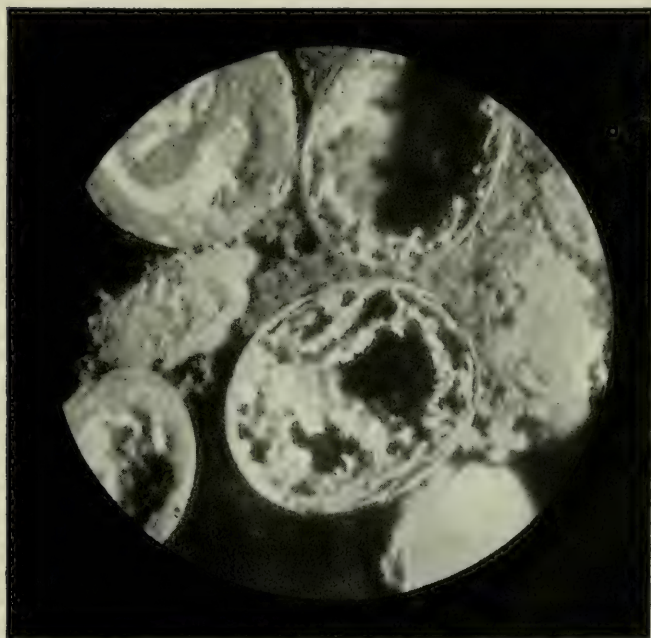
Some of the thin seams are good ironstone, but the cost of working renders them of no value at present.

Two exceptions must be made. At Grosmont, near Whitby, the main seam, if at all recognisable, has become an attenuated band of about 12 inches thick, but the *Pecten* and *Avicula* beds each average $3\frac{1}{2}$ feet to $2\frac{1}{2}$ feet in thickness; there is a thin shale band in one or both seams, and they are separated by a thick bed of shale. Considerable quantities



No. 5.—Included matter in fossil bone.

Polished surface (flat) on left. On the right (showing relief) is the surface after etching with Hydrochloric acid. The dark portions represent hollows produced by the action of the acid. Magnified 30 diameters.



No. 6.—The same specimen as in No. 5, more highly magnified, showing silicification of the outer envelopes of two of the Oolitic grains. The dark parts in the photo were filled with Carbonate of lime. Magnified 50 diameters.

Eston.

Roseberry.

Ingleby.

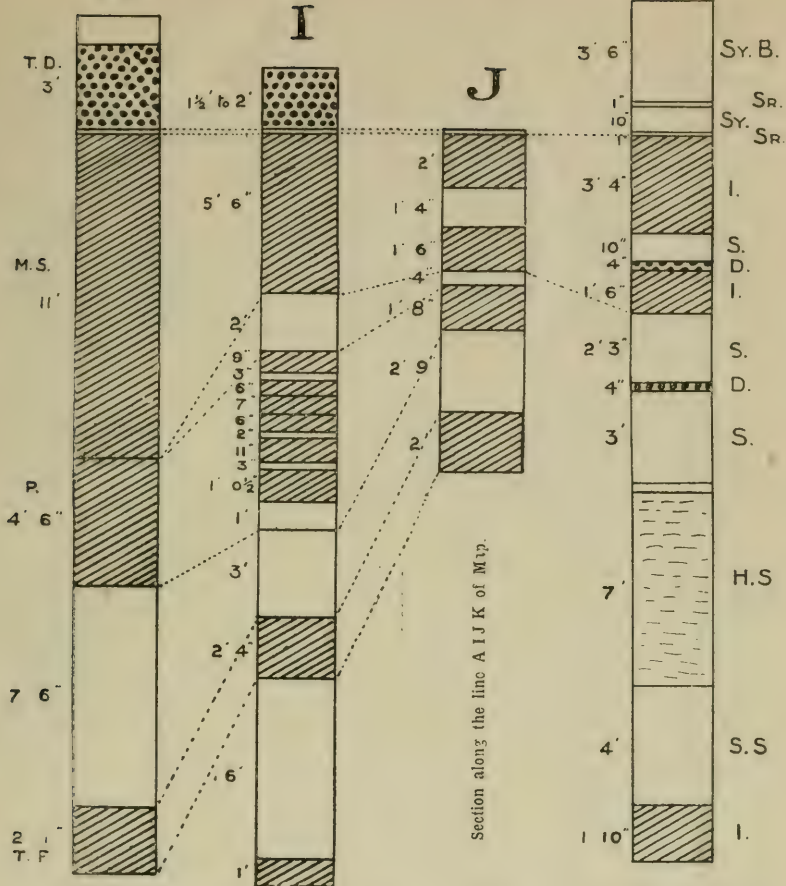
Swainby.

A

I

J

K



Kilton.

Liverton.

Liverton.

Liverton.

Liverton.

Monument.

P

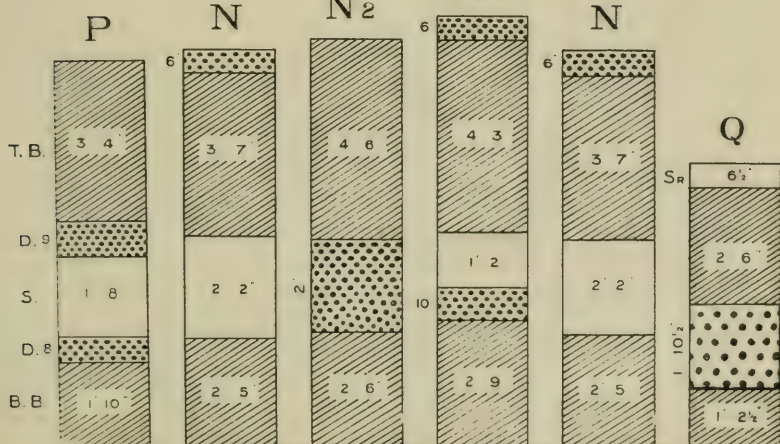
N

N₂

N₁

N

Q



Section along the lines P-N and N₂ of Map.

were worked years ago, and the mines were again recently re-opened, and although now closed it is quite possible that with a lower carriage rate to the furnaces they may again be worked in the future, especially if the stone can be calcined where won.

In Rosedale, the Dogger proper, that is the bed lying on the top of the Alum Shale, reaches a peculiar development, and in places on the east side is, or rather was, as much as 14 feet in thickness of good ironstone, but although a good thickness is maintained the quality deteriorates so much that, in the words of the lessees, 'it is really no use.' On the west side the seam varies from about eight feet thick at the outcrop to five feet where work was abandoned in Sheriff's pit owing to water.

The useable stone gradually got narrower as the work extended, and the working place was only about 80 yards wide when left. The stone on the west side gradually 'nips out.'

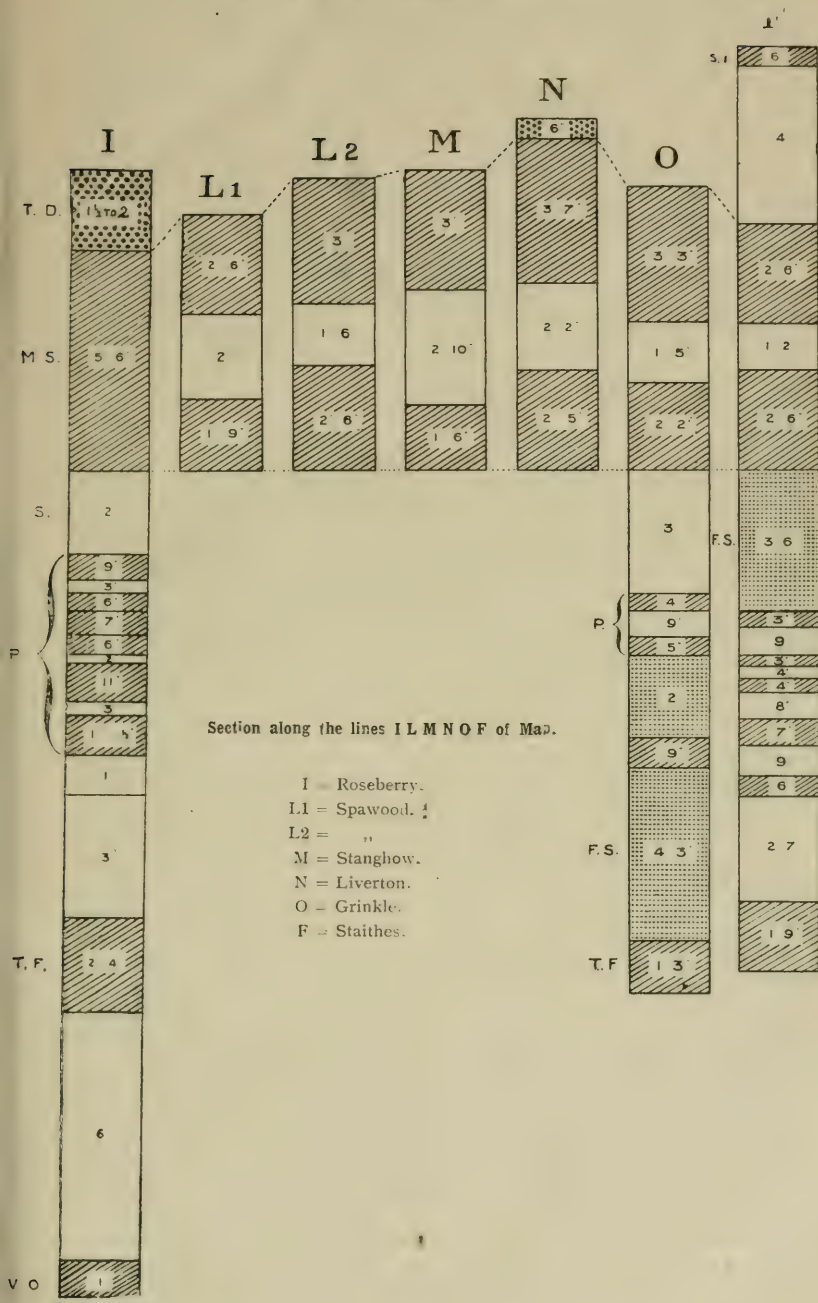
The Carlton Iron Company, Ltd., kindly gave me the above particulars, and their man, who latterly had charge of the Rosedale mine, adds, 'On the west side there is a gradual nip out all along the workings. We worked many places as low as 18 inches. The indications were that the ironstone was entirely disappearing and that the shale (a clayey material) and belmonite (a hard flinty material, not sandstone) would eventually join. There have been no proved indications in the Farndale Valley adjoining that a workable stone exists, although traces are found of an inferior stone at a lower level.'

Below the dogger, and in a hollow in the alum shale, the magnetic ore was found forming a lenticular mass about 70 feet thick in the thickest part.

Rosedale may be said to be practically worked out, and probably 8,000,000 or 9,000,000 tons have been obtained from that source.

The quantity of stone available has been very variously estimated by different writers. Joseph Bewick, writing in 1860, estimated the available quantity of workable ironstone at 4,820,659,200 tons, sufficient for 680 years at 7,000,000 tons per annum. He no doubt based his calculation on the Grosmont beds having a workable thickness over the whole of the Cleveland area. Mr. John Bell and Mr. John Jones jointly reporting to the Iron and Steel Institute in 1871, on the iron ores of Northumberland and Durham and the North Riding of Yorkshire, estimated the workable stone of the Cleveland main seam at 525,000,000 tons, basing their calculation on an area of about 27 square miles or say 17,500 acres, containing 30,000 tons per acre. They erroneously report that the seam worked at Grosmont is the main seam.

Mr. George Barrow, of the Geological Survey, in a paper read before the Cleveland Institute of Engineers in 1879,



gave the total quantity of workable stone in the main seam as 685,650,000 tons.

I have been at some trouble to make an independent estimate and I arrive at figures very closely agreeing with those of Mr. Barrow. According to my calculation the total area of workable stone in the main seam is 43.48 square miles, or 27,827 acres. The sp. g. is 2.86* which gives 3,467.89 tons per acre for every foot in thickness. Taking the average thickness of stone at seven feet, this gives 24,275.3 tons per acre. 27,827 acres by 24,275 tons gives 675,500,425, differing only from Mr. Barrow by about 10,000,000 tons. From the quantity thus ascertained must be deducted waste in winning, which will approximate 10 per cent. and leave the available quantity 607,950,383 tons, of which there has already been won about 270,000,000 tons, leaving unworked about 338,000,000 tons, which at 6,000,000 tons per year will last 56 years.

This leaves out of account the top seam, the Pecten seam, and the two foot seam, which together probably contain more stone than the main seam. It is all a question of cost whether they enter the field against imported ores or remain where they are for the edification of a future race of geologists.

The seams over considerable areas are full of local faults, and there are some of greater magnitude. The dips are variable, but the highest position above sea level is in the west. At Eston the outcrop is about 300 feet above sea level with a dip of 3 inches to the yard. At Roseberry it is about 750 feet above sea level with a gentle dip to the south-east. At Stanghow south it is 151 feet above sea level, with a dip of .815 inches per yard south-east. At Liverton south the seam is 218 feet below sea level.

The percentage of iron in the stone is fairly constant in given areas (although as already said, it gets decidedly worse eastward and southward), but it is very variable in distribution throughout the mass.

According to Dr. Stead, the porosity of the Raw Ironstone is 22 per cent. of the actual volume. From this one may conclude that there must have been a considerable amount of carbonate of lime dissolved and carried away in solution subsequent to the conversion of the major portion of the original limestone rock into carbonate of iron, as the shrinkage from substitution is insufficient to account for such a high porosity.

My thanks are due and heartily tendered to Dr. Stead for the loan of the blocks on Plates VIII.-X., and to the Mines' Managers who have kindly supplied me with the latest facts which have enabled me to prepare sections of the main seam up-to-date.

* Vide Dr. J. E. Stead.

NOTES ON THE FARNE ISLANDS FOR 1912.

R. FORTUNE, F.Z.S.

THE following notes, based upon Mr. Paynter's Annual Report, and my own experiences, show that, despite the inclement weather of last year, the birds on the whole had a very successful nesting season.

The Sandwich Terns were more numerous than usual, and very few young ones died. The same remarks apply to the Arctic Terns. On the Brownsman the latter species has increased considerably over a thousand nests being seen there.

The Roseates have apparently increased, and four or five pairs are supposed to have nested. Two pairs were observed constantly, feeding their young on the Knoxes.

Puffins continue to increase, and are blamed for destroying the vegetation on the islands where they breed. Many young ones, as is always the case in wet seasons, were drowned in their holes.

The Cormorants did not nest on their ancient home, The Megstone, but a considerable number nested on the North Wamses, where the Gulls, as usual, gave them a lot of trouble, which caused many of them to move to the Harkus, where for some years there has been a colony. The colony on the Outer Wide-opens did very well, as they are but little molested by the Gulls.

Eider Ducks did well on all of the islands. These birds are now very numerous. We, however, saw several clutches of deserted eggs, partly buried in the sand or vegetation.

Guillemots were as abundant as ever, and there seemed to be more of the ringed variety than usual. The few pairs of Razorbills frequenting the Farnes hatched out on the Outer Wide-opens. These birds do not increase owing to the absence of suitable nesting sites, the eggs having to be deposited upon an open ledge, contrary to the usual habit of this species, which prefers a crevice or cranny in which to deposit the eggs.

Kittiwakes occupied practically every place available for them on the cliffs of the Staple Island and on the precipitous sides of the Pinnacles. They are delightful birds, and it is a treat to be able to observe them at such close quarters as one can do on the Farnes.

The Lesser Black-back Gulls, needless to say, showed no decrease in numbers. They are too numerous, and constantly bully some of the other species, Terns and Cormorants especially. They are very destructive to the young Terns and Puffins.

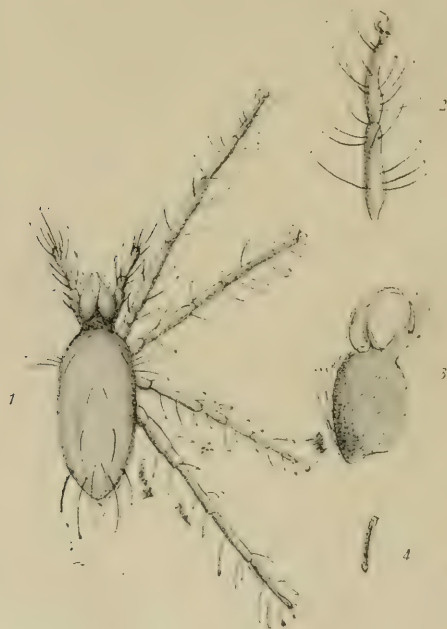
A pair of Common Gulls again nested and hatched three young ones, but they were unfortunately destroyed by the Lesser Black-backs. This is extremely unfortunate, as if a colony of Common Gulls could be established it would be a great attraction to the islands.

Oystercatchers and Ring Plovers were present in about their usual numbers.

THE MITES KNOWN AS RHAGIDIA.

C. F. GEORGE, M.R.C.S.,
Kirton-in-Lindsey.

THE only account of these mites that I have met with is to be found in the 'Treatise on the Acarina,' by Nathan Banks, page 14. He says that 'Rhagidia is a remarkable genus. The species are pale or whitish in colour, and occur under damp fallen leaves, and on moist soil. Its structure is in many ways very similar to that of certain Solpugida and suggested



Rhagidia sp.

- Fig. 1.—The mite. X 15.
 „ 2.—Two terminal joints of leg with claws and hair-pad.
 „ 3.—Mandibles.
 „ 4.—Setose hair.

to Thorell its generic name, which is a diminutive of Rhax, a genus of the Solpugida. It is probable that it is the most primitive of all existing mites, and points to the close relationship of the Acarina to the Solpugida. Our common species, *R. pallida* Banks, is found throughout the country, but more commonly in the north. Other species are found in Europe,

Naturalist,

Japan, Kerguelen, Chile, and the Arctic regions.' He also gives a figure of *Rhagidia pallida* Banks. This figure hardly looks like the specimen I have met with, which may therefore be a different species. The first specimen I ever saw, was sent to me with other mites, by Mr. Evans, of Edinburgh, in January, 1909. Since that time I have had two or three specimens from Mr. Winter, of Shipley, Yorkshire, who found them in some numbers. Unfortunately all the specimens I have received have been in preservative solutions, and the mites are very delicate and easily injured, and from these Mr. Soar made the accompanying drawings. I had hoped to have seen a living specimen so as to observe its colour and general appearance. However, I have not yet had that pleasure.

The first thing that strikes one is the large size of the powerful chelate mandibles; the next, the great length of the legs, which accounts for the mites being quick runners, and between the claws they are furnished with a large and well developed footpad. The hairs also are frequently bent in a sudden and peculiar fashion not commonly found among mites. Whether this is an accidental or a post mortem effect I cannot say. The joints of the palpi are peculiarly sausage-shaped. No doubt these mites are widely distributed, and fairly numerous, especially in the north. Possibly some readers of *The Naturalist* will be able to give me some information about these very curious creatures.

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BIRDS.

Common Gull Inland.—On 24th March, 1913, thirteen Common Gulls, in fine summer or breeding plumage, were in a field near Eshton, Skipton. Odd ones, and occasionally twos, have previously been noted both in Airedale and Wharfedale many times.—H. LUMBY and W. H. PARKIN, Shipley.

Variety of Song Thrush.—On 24th March, 1913, a peculiarly marked Common Song Thrush, with a deep black crescent across the upper breast so conspicuously coloured that it could be easily observed at a considerable distance, was seen at Eshton, near Skipton.—W. H. PARKIN.

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GEOLOGY.

Remains of a Seal in the Holderness Glacial Drift.—A bone recently found in the Glacial Gravels at Kelsey Hill, Holderness, proves to be the fibula of a seal, though it is not possible at present to state exactly what species. This is an addition to the list of animal remains from these gravels. I am indebted to Mr. E. T. Newton, F.R.S., for examining the specimen. Other recent finds include the tooth of *Rhinoceros leptorhinus*, and bones of *Bos primigenius*.—T. SHEPPARD.

THE JURASSIC PLANT BEDS OF ROSEBERRY TOPPING.

H. HAMSHAW THOMAS, M.A., F.G.S.

At the present time there is an excellent opportunity for studying an exposure of very great importance to those interested in fossil-plants. The beds which have recently been exposed near the summit of Roseberry Topping almost rival the famous Gristhorpe bed in the beauty and variety of the plant-remains in them. The hill, which forms a landmark well-known in North Yorkshire, is a conical outlier, consisting of Lias capped by a small group of Estuarine rocks. Owing to mining operations, part of the massive sandstone capping has slipped down, carrying with it the underlying beds and forming a scree below. In this way the beds forming the summit of the hill have become exposed, and have provided ample material in the scree from which fossils can be collected.

On the south side of the exposure the massive sandstone appears to rest directly upon the Upper Lias, in which *Ammonites* are very rare, though a single fragment, probably of *Ammonites communis*, has been seen. At the northern end of the exposure, however, there are eight or ten feet of black and yellow shales between the Lias and the sandstone. These appear to be quite conformable with the underlying strata, but thin out as we pass northwards. The beds have not yet been carefully traced between the north and south ends of the exposure owing to the disposition of the scree material and to the great risk from falling blocks. The plant beds have been found on the other side of the hill and also on the main escarpment about half a mile away towards Hutton. They appear to be absent from the southern face of the escarpment towards Easby. Probably here, as at Marske, the plant layers are of somewhat local occurrence, such as might have been produced by the filling in of a lake or lagoon on the rising land surface. The character of the sediment, when traced laterally, varies from a fine black shale to a micaceous shaly sandstone, and this may point to the same conclusion.

The distribution of plant remains in these beds seems to offer some points of interest. One form, *Equisetites Beani*, is very abundant, and is found almost everywhere, but most of the others are very limited in their horizontal and vertical distribution. They are never indiscriminately mixed, but in one place the shale is full of *Zamites gigas* fronds, together with some *Anomozamites*, and a short distance away *Nilssonina mediana* is most abundant, with *Ctenis falcata* and *Elatides* twigs. In these blocks a narrow layer contains many *Ginkgo*

leaves, while in other places beautiful pieces of *Ctenozamites* fronds are seen. This same type of distribution is seen at Gristhorpe and in other plant beds, and it is very important for the collector to remember that by working along the zone for a few yards he may possibly come across new plants. Of course this type of distribution is probably what we should expect to find in beds laid down under estuarine conditions.

The fossil flora of the Roseberry series is a rich one, and the following is a provisional list of the species already discovered :

<i>Equisetites Beani</i> (Bunb.).	<i>Taeniopteris</i> sp. [new].
<i>Sagenopteris Phillipsi</i> var. <i>major</i> Seward.	<i>Nilssonsonia mediana</i> (Leck. ex Bean MS.).
<i>Laccopteris polypodioides</i> (Br.).	<i>Nilssonsonia orientalis</i> Heer.
<i>Dictyophyllum rugosum</i> (L. & H.).	<i>Ctenis</i> sp. (cf. <i>falcata</i> L. & H.).
<i>Häusmannia</i> sp.	<i>Pseudoctenis Lanei</i> Thomas.
<i>Cladophlebis denticulata</i> (Br.).	<i>Ctenozamites Leckenbyi</i> (Leck. ex Bean MS.).
<i>Cladophlebis</i> sp.	<i>Thinnfeldia</i> sp. (cf. <i>rhomboidalis</i> Ett.).
? <i>Todites Williamsoni</i> (Br.), [sterile].	<i>Thinnfeldia</i> sp. (cf. <i>incisa</i> Sap.).
<i>Marattiopsis anglica</i> Thomas.	<i>Baiera longifolia</i> Heer.
<i>Phlophyllum</i> (<i>Williamsonia</i>) <i>pecten</i> (Phill.).	<i>Ginkgo</i> sp. (cf. <i>læpida</i> Heer.).
<i>Zamites</i> (<i>Williamsonia</i>) <i>gigas</i> . L. & H.	<i>Ginkgo digitata</i> (Br.).
<i>Anomozamites</i> (<i>Wielandiella</i>) <i>Nilssonsoni</i> (Phill.).	? <i>Czekanowskia Murrayana</i> (L. & H.).
<i>Taeniopteris vittata</i> Br.	Coniferous twigs (<i>Elatides</i>), with ♂ and ♀ cones.

The above list has been drawn up in the field, and is only meant to give some idea of the flora. A number of the forms mentioned will have to be critically examined later.

In its general characters this flora is very distinct from any Yorkshire Mesozoic flora previously described. The most abundant plants are *Equisetites Beani*, *Nilssonsonia mediana*, *Marattiopsis anglica*, and *Thinnfeldia*, which nowhere else are dominant plants. While possessing considerable similarity to the flora of the Marske Quarry, *Dictyozamites*, which is so characteristic of that locality, is apparently entirely absent here. It is also noticeable that several of our most important plants are distinctly Liassic in character. The *Thinnfeldias*, are most common in deposits of Liassic age, while *Marattiopsis* is a genus which is abundant in the Rhaetic and Lias of South Sweden and Germany.

Among the plants specially worthy of notice stands *Marattiopsis anglica*, which I have recently described* for the first time from Marske. Fine specimens of its long pinnae are often to be found, while fertile specimens showing the long synangia running along the veins are not uncommon. It is at first difficult to distinguish the sterile pinnae from the fronds of *Taeniopteris vittata*, but they may be soon recognized

* *The Naturalist*, 1913, p. 123.

by the forking of the secondary veins very close to the midrib and the wide separation of the ultimate divisions.

The plants which in their external form seem identical with *Thinnfeldia rhomboidalis* Ett., are probably the most interesting of the whole flora from several points of view. They occur in such abundance as to form beds nearly an inch in thickness, which consist almost entirely of plant remains with very little admixture of muddy material. The individual leaves and leaflets readily separate, and the deposit resembles the so-called 'paper-coal' of Russia. In the beds on the main escarpment, at a considerable distance away, this *Thinnfeldia* is the dominant plant throughout three or four feet of shale, and from this locality very beautiful specimens can be obtained. From the immense quantities of *Thinnfeldia* leaves seen in this district, it is evident that the plants which bore them must have dominated the vegetation in the neighbourhood at the close of the Liassic period, though their remains are very rare in other parts of Yorkshire.

Many of the other plants in the black shale are very beautifully preserved in a mummified state, and can be readily detached from the matrix if the original cuticle was moderately thick. Specimens of *Zamites*, *Anomozamites*, *Ctenozamites*, *Ctenis*, etc., can all be obtained in this way, and from them good microscopic preparations, showing the structure of the epidermal cells and stomata, can be obtained by treatment with potassium chlorate and nitric acid.*

Few traces of 'flowers' or seeds have yet been obtained, though some large separate seedlike structures comparable with those of modern Cycads have been observed. Probably further investigation will lead to more discoveries in this direction.

The Roseberry beds not only present a deposit of the greatest interest to the geologist and botanist, but they undoubtedly offer a large and promising field for investigation. They indicate also the probability of finding other rich plant beds of the same horizon on other parts of the escarpment in the district, which should lead to further extensions of our knowledge of the Jurassic Flora of Yorkshire.

Good old Filey! According to the daily press a 'six-legged field-mouse has been caught in a trap at Filey.'

Mr. E. Hawkesworth, of Sunny Bank, Crossgate, Leeds, has been elected Hon. Treasurer to the Yorkshire Naturalists' Union, in place of the late H. Culpin.

The Senate of the Dublin University has agreed to the conferment of the honorary degree of Doctor of Science upon Professor A. C. Seward, F.R.S., a past-president of the Yorkshire Naturalists' Union.

* For the methods employed see *New Phytologist*, 1912, p. 109.

THE CRETACEOUS LAMELLIBRANCHIA OF YORKSHIRE.

CHARLES P. CHATWIN, F.R.M.S.

WHEN Mr. Henry Woods essayed to write a monograph of the Cretaceous Lamellibranchia the nomenclature of that group was extremely unsatisfactory. Only three families, the Trigoniidæ, the Nuculanidæ, and the Nuculidæ had received detailed attention; and the literature of the whole class was extensive, and scattered through numerous journals and separate publications. The first part of the monograph was published by the Palæontographical Society in 1899, and since then one part has appeared every year, and the work is now complete in two volumes.

Lamellibranchs from all the English Cretaceous rocks have been dealt with in the monograph, and the present seems a suitable opportunity of recording in general terms the results of Mr. Woods' work so far as the species from Yorkshire are concerned. The following notes therefore are compiled from the monograph, in which we believe most authentic records to be included; and they are intended chiefly for the use of local collectors.

The *Nuculas* were studied by Starkie Gardner in 1884, but have been subjected to further revision in the present work. Thus to the genus *Nuculana* are referred Forbes's *Nucula spathulata* (which occurs as doubtful casts), Phillips's *Nucula subrecurva*, and Gardner's *Leda seeleyi*. The species described by Orbigny as *Nucula scapha*, and considered by Gardner as *Leda*, is now to be called *Nuculana* [*? Yoldia*] *scapha*, and *Nuculana speetonensis*, Woods, is a new species, probably the same as that denoted by the manuscript name *Nucula equilateralis* of Bean (not of F. A. Roemer). Among the Nuculidæ, *N. ovata*, Phillips (not Mantell), has been found to be synonymous with *N. planata*, Deshayes, which name must now be used; and a new species *N. lamplughi*, Woods, has been founded for a form much like *N. planata*. All the foregoing species come from the Speeton Clay (Lower Cretaceous) of Speeton. The name of the form that occurs in the minimus-marls of the same locality, *Nucula pectinata*, J. Sowerby, remains unchanged.

The specimen that occurs in the brunsvicensis-zone at Speeton, which Phillips, in his first edition of the 'Geology of Yorkshire,' called *Cucullæa*, and in the third edition *Cucullæa securis*, can now be referred to as *Grammatodon securis* (Leymerie). The genus *Plicatula* is represented by two species, *P. placunæa*, Phillips, a doubtful determination from the Lower Cretaceous of Speeton, and *P. inflata*, J. de C. Sowerby, from the Chalk Marl and subglobosus-zone of Speeton. The latter

is quite a common and characteristic fossil of the same horizon in the South of England.

Much work has been done from time to time in subdividing the Pectinidæ, and *P. orbicularis*, J. Sowerby, from the brunsvicensis-zone at Speeton is now referred to under the genus *Syncyclonema*. Under *Camptonectes* are included *Pecten cinctus*, J. Sowerby, from the jaculum-zone of Speeton, and *P. striato-punctatus*, Roemer, from the lateralis and jaculum zones. *Pecten cretosus* DeFrance, from the Chalk, is not recorded from Yorkshire in the present monograph, but it is mentioned in Rowe and Sherborn's list (Proc. Geol. Assoc., vol. 18, p. 295, 1904); it now belongs to Bolten's genus *Chlamys*.

The names of *Plagiostoma hoperi*, Mantell, from the quadratus-zone of the Coast, of *Lima subrigida*, Roemer, from the Upper Speeton Clay, and of *Perna mulleti*, Deshayes, from the Lower Speeton Clay, still hold good, but *Lima elongata*, Roemer, from Speeton, should now be referred to as *Lima (Acesta) longa*, Roemer. In the lateralis-zone of Speeton, examples of a *Lima* like *granulatissima* have been found; and these probably belong to the genus *Limca*. Further Limas from Speeton include the form described by J. Sowerby as *Modiola elongata*, but which now is to be called *Lima (Mantellum) parallela*; and the casts occurring in the jaculum-zone are probably the same as *Plagiostoma elongata*, to which the new name *Mantellum gaultina*, Woods, has been applied.

Two of the Aviculæ described by Roemer have been recorded from the Yorkshire Cretaceous. *A. macroptera* (referred to by Lamplugh as *A. inæquivalvis*) = *Pteria (Oxytoma) cornuelianum* Orbigny, from the lateralis-zone of Speeton, and *A. lineata* = *P. (O.) tenuicostata*, Roemer sp., from the quadratus-zone of Sowerby and Ruston Parva. The form described by Fischer de Waldheim as *Inoceramus concentricus*, which is the same as that for which Phillips used the Bean MS. name *Perna imbricatus*, should now be called *Aucella keyserlingiana*, Trautschold. It comes from the jaculum-zone of Speeton. J. de C. Sowerby's *Avicula gryphæoides*, from the Red Limestone and varians-zone of Speeton, belongs to the genus *Aucellina*; while Phillips' *Pinna gracilis*, of which the type cannot be found, is probably the same as *P. robinaldina*, Orbigny, a name that has priority.

Three forms of *Astarte* have been found at Speeton. *A. senecta*, a form from the lateralis-zone, has been established under Bean's MS. name. Another form, resembling *A. senecta*, but of which only the right valve is known, has been called *Astarte* sp. The third, now called *A. (Eriphyla) lævis*, is the same as described by Phillips as *Crassina lævis*. The Cyprinidæ and the Cardiidæ are not numerous, the families being respectively represented only by *Cyprina* sp., and *Proto-cardia* sp.

Other changes in nomenclature may be noted briefly:—*Isocardia angulata*, Phillips (common in the jaculum and brunsvicensis-zones of Speeton)=*Corbula angulata*. *Pholadomya neocomiensis*, Leymerie (from the Lower Cretaceous of Speeton)=*Panopæa gurgitis* (Brongniart). *Pholas constricta* Phillips (same horizon and locality)=*Martesia constricta*. *Mya depressa*, Phillips (jaculum-zone, Speeton)=*Thracia phillipsi*, Roemer. *Mya phascolina*, Phillips, probably belongs to the genus *Tellina*. One new species of *Pholadomya*, from the lateralis, jaculum, and brunsvicensis-zones of Speeton, has been established under the name *P. speetonensis*, Woods.

The Oysters have received special attention and are profusely illustrated in this monograph, but only one Yorkshire species is discussed, namely *Exogyra sinuata* (J. Sowerby) from Speeton. In the treatment of other members of the family due attention has been paid to the plasticity of the group and to the effects of environment. Thus the general tendency has been to include under one name forms that have hitherto been regarded as separate species. Dr. Rowe (Proc. Geol. Assoc., vol. 18, p. 295, 1904) lists four species from the Chalk of Yorkshire, and three of these, *O. vesicularis*, Lamarck, *O. hippopodium*, Nilsson, and *O. proboscidea*, Archiac, must now be included under *O. vesicularis*, Lamarck. The fourth was listed as *O. wegmanni*, but this species has not been found in the English Chalk, *O. boucheroni*, being the correct name.

The Inocerami also were studied particularly, and besides an exhaustive account in the monograph, a separate paper appeared on the evolution of this genus.* Probably no group of the Mollusca was in greater need of study than the Inocerami, so the wisdom of the Council of the Palæontographical Society in devoting a great number of illustrations to this genus is to be appreciated. Many important points were established as a result of the complete survey of the group: some species were found to occur at definite horizons, transitions between species could be traced, and definite factors determined in the evolution along certain lines. Thus *Inoceramus crippsi* Mantell (the name has done veteran service in its time by covering a multitude of widely different forms) is a species confined to the Cenomanian, characterising especially the varians-zone. Its variety *reachensis*, Etheridge, is confined to the subglobosus-zone. A complete transition can be traced through *Inoceramus* (no longer *Actinoceramus*) *sulcatus*, *I. concentricus*, var. *sub-sulcatus*, to *Inoceramus concentricus*, and from *Inoceramus lamarchi* Parkinson to *Inoceramus* (no longer *Volviceramus*) *involutus*, J. de C. Sowerby. As definite factors in the evolution of the group we may note the angle

* Quart. Journ. Geol. Soc., 1912, pt. 1, pp. 1-19.

made by the axis of growth with the hinge-line, and the proportionate length of the hinge with the height of the shell, as seen in the series *I. labiatus*, *I. labiatus* var. *latus*, *I. inconstans*, and *I. balticus*.

To return to the Yorkshire Inocerami, however, we find that the earliest determinable forms occur in the Red Limestone (Albian) of Speeton, and their names *I. sulcatus*, Parkinson and *I. tenuis*, Mantell, still stand. *I. concentricus*, Parkinson, a species found very commonly in the Albian of other parts of England, is not recorded in the Monograph from Yorkshire. Mantell's *I. mytilloides*, which has a wide distribution in the cuvieri-zone, and which was found by Dr. Rowe on the Yorkshire Coast, is now to be called *I. labiatus* Schlotheim. In the Chalk of the cortestudinarium-zone of Wharram has been found the important *I. inconstans* Woods, a new species founded on Mantell's *I. brongniarti* var. The value of this new species can be seen by its connecting the narrow and high low-zonal *labiatus* with the long-hinged *balticus*. Four species described by Goldfuss occur in the Upper Chalk of Yorkshire, *crippsi* (non Mantell), *lobatus*, *lingua*, and *cardissoides*; the last three names now stand, but Böhm's *balticus* should be used instead of Goldfuss's *crippsi*.

One new species from the upper Chalk is described, *I. tuberculatus* Woods, a form allied to *I. lobatus*, and resembling also *I. cardissoides* Schröder. Another ribbed form, which occurs in the quadratus-zone near Sledmere, has been found to be the same as a specimen from Brighton, to which Willett's name *I. pinniformis* has been applied. Three Chalk species of another group remain to be mentioned. *Inoceramus lamarcki* Parkinson, found on the coast, and ranging from the cuvieri to the coranguinum-zones, is perhaps the commonest species in the chalk; its synonymy occupies three pages of the monograph. It is the same as the *brongniarti* of Mantell and of J. Sowerby, and its variety *cuvieri*, J. Sowerby, is the gigantic form that is seen in long pieces in section and in a fractured state in the chalk, and used to be regarded as a separate species. *Inoceramus lamarcki* passes into *I. involutus*, J. de C. Sowerby, for which a separate genus *Volviceramus* was established by Stoliczka, but which now will not be used. *I. cordiformis*, J. Sowerby, a species like *I. lamarcki*, but distinguished by the presence of radial folds, has been recorded from the cortestudinarium-zone of Wharram Percy.

The foregoing list should include most of the Cretaceous Lamellibranchs of Yorkshire, and a brief account of the result must take the form more or less of the hurling of facts. It is hoped, however, that these notes may prove of service in the revision of names in collections, and in drawing attention to the results of a work that may not be easily accessible.

YORKSHIRE NATURALISTS AT ROCHE ABBEY.

FOR the first time in the history of the Union, the year's excursion programme was commenced in the month of March. Originally intended to extend over the week-end, the outing to Roche Abbey had perforce to be reduced to Easter Saturday only, as suitable headquarters could not be obtained within the immediate neighbourhood; even Rotherham, the city beautiful (?), failing in this latter respect. The rural charm of Maltby will soon be but a memory, owing to the activities in the Yorkshire Coalfield, a new pit having been sunk in Maltby Wood. The Union had twice visited the district, in 1896 and 1905, and owing to the changes which will doubtless result by the colliery operations it was thought best to take advantage of present conditions before this activity made itself felt.

Certainly it was an auspicious start, those present including the President, Mr. Harold W. T. Wager, F.R.S., and with one exception, every section's official representative. Under the guidance of Mr. E. Snelgrove, the whole party worked alongside the stream as far as Lovatt's Mill, and thence through the woods to Roche Abbey, where, after a brief rest for lunch, the party divided, the general body of naturalists inspecting the ruins of the Abbey and working through the grounds beyond, to the village of Stone, and back to headquarters through King's Wood. A party of geologists, under the guidance of Mr. C. Bradshaw, visited the new colliery in Maltby Wood, where they searched the waste materials for fossils.

Prior to the ordinary meeting a special meeting of the Permanent General Committee was held, when the old rule as to the constitution of the Executive was substituted by the following new rule, viz:—

“That the Executive shall consist of the President, Ex-Presidents, the Presidents of the Sections lettered B, C, D, E, and F, the Honorary Secretaries, the Honorary Treasurer, the Divisional Secretaries, the Editors and Sub-Editors of *The Naturalist*, the Soppitt Memorial Librarian, and the delegate to the British Association, together with a representative selected by each Section and Committee of Research.”

The election of Mr. Edwin Hawkesworth to the office of Treasurer of the Union was unanimously carried.

Sectional reports of the work done during the day were given as follows:—Geology, Mr. C. Bradshaw; Flowering Plants and Mosses, Mr. E. Snelgrove; Fungi, Mr. W. N. Cheesman; Vertebrate Zoology, Mr. W. H. Parkin; Conchology, Mr. W. D. Roebuck; Arachnida, Messrs. W. Falconer and W. P. Winter.

Heartly thanks were accorded to Mr. E. Snelgrove, for his services in connection with the local arrangements for the

excursion; also to Lord Scarborough for permission to visit Roche Abbey and grounds, and King's Wood; and to Mr. W. C. Meredith for access to the garden and grounds at Firbeck.

Six new members were elected, and the Selby Scientific Society was admitted to affiliation with the Union.

VERTEBRATE ZOOLOGY.—Mr. W. H. Parkin writes:—

Of the twenty-six species of birds noted by Mr. Chislett, and the writer, perhaps the Gold Crested Wren was the most interesting. It occurred frequently, the masses of fine yew trees providing a sheltered hunting ground for insect life, and suitable nesting sites. At times two and three males poured forth their highly pitched song at the same time.

A pair of Kestrels, and a Bullfinch, in perfect feather, were noted. A Mallard, all alone, an unusual incident at this time of the year, was flushed out of the marshy end of the lake.

In King's Wood, Jays and Magpies and the Great and Blue Tits were seen and heard.

Mr. Vardey reported seeing the Green Woodpecker and Nuthatch.

The Squirrel was observed in King's wood.

CONCHOLOGY.—Mr. W. Denison Roebuck reports that the collecting was mainly done by Mr. Greevz Fysher and himself. The rich district of Roche Abbey and King's Wood yielded *Agriolimax agrestis* var. *reticulata*, *A. lævis*, *Arion ater* v. *succinea*, *A. circumscriptus*, *A. intermedius* (a small colony of young on a single stick), *Vitrina pellucida*, *Hyalinia helvetica*, *H. nitidula* and also several examples of its beautiful albino form, var. *virens-albida*, *H. radiatula*, *H. crystallina*, *H. fulva*, *Pyramidula rotundata*, *Helicigona arbustorum*, *Cochlicopa lubrica*, *Limnæa truncatula*, *L. peregra*, *Planorbis albus*, *Pl. vortex*, *Valvata piscinalis*, *Sphærium corneum*, *Pisidium fontinale* and *P. pusillum*; the evidence of the day's collecting showing species of wood and marsh, and amounting in number to five slugs, nine land and eight freshwater shells—a total of twenty-two. The critical species have been seen by Mr. J. W. Taylor.

ARACHNIDA.—Mr. Wm. Falconer writes:—

From Maltby, both sides of the stream were examined as far as the common, Mr. Winter obtaining an immature female of *Philodromus dispar* Walck, not an uncommon spider farther south, but up to the present recorded only from three other places in the county, all solitary examples. Thence the left bank was followed as far as Roche Abbey. This part of the route yielded me an adult female of *Wideria cucullata* C. L. Koch., and a male *Leptyphantès flavipes* Bl., the latter with as yet very few recorded localities in Yorkshire, while amongst the grass growing on the ruins, I found several immature examples of *Theridion bimaculatum* Linn.—once thought to be

a very rare spider but very interesting as the one of its family which carries its egg sac about with it, attached to its body—and *Tibellus oblongus* Walck. In the absence of foliage and scarcity of flying insects, most spiders were still in various situations on the ground, but immature specimens of *Linyphia montana* Clerck, *L. peltata* Wid, *Philodromus*, *Epeira diademata* Clerck., *Tetragnatha solandrii* Scop., and adult females of *Theridion pallens* Bl., had already ascended into, and were beaten from the numerous fine evergreens, yew and box trees. On the whole, however, spiders were not plentiful, and many kinds being too young could not be determined, but there can be no doubt that the locality would later on amply repay research.

As the district has not hitherto been worked for its spiders, the list of thirty different kinds and one false scorpion, found by Mr. W. P. Winter and myself, is given in full :—

Clubiona terrestris Westr., two ♂s.
C. reclusa Camb., one imm. ♀.
C. comta C. L. Koch, one imm. ♀.
Dictyna uncinata Westr., imm.
Amaurobius fenestralis Stroem, ♂s.
 and ♀s.

Tegenaria derhamii Scop.
Theridion bimaculatum Linn., imm.
T. pallens Bl., adult ♀s.
Linyphia montana Clerck., imm.
L. peltata Wid., imm.
L. clathrata Sund., imm.

Labulla thoracica Wid., imm.
Leptyphantes flavipes Bl., one ♂.
Bathyphantes concolor Wid., one ♂.
B. nigrinus Westr., adult ♂s and ♀s.

Macrargus rufus Wid., one ♀.
Rhabdovia diluta Camb., one ♂.
Maso sundevallii Westr., two ♀s.
Nerienne rubens Bl., one ♀.
Diplocephalus fuscipes Bl., two ♂s.
Wideria cucullata C. L. Koch, one ♀.
Cornicularia cuspidata Bl., ♂s and ♀s.

Ero furcata Vill., two ♀s.

Tetragnatha solandrii Scop., imm.
Pachygnatha clerkii Sund., one ♀.
Meta segmentata Clerk., one adult ♂.
Epeira diademata Clerck., imm.
Philodromus dispar Walck, one imm.
 ♀.

P. aureolus Clerck. or *cespiticolis*
 Walck, imm.
Tibellus oblongus Walck., imm.

Obisium muscorum Leach, many.

THYSANURIDÆ.

A solitary example of the inland *Petrobius* was taken amongst stones not far from the gate-house.

MYRIAPODA.

The following were observed by Mr. Winter and myself :—

Lithobius forficatus Linn.
Geophilus flavus Degeer.
Julus sabulosus Linn.
J. terrestris Linn.
Glomeris marginata Vill.

FLOWERING PLANTS.—Mr. E. Snelgrove writes :—

It is no exaggeration to speak of the district as a Botanist's Paradise. Though so early in the season, and that a cold one, the visitors enjoyed a foretaste of what it can offer when the season is sufficiently advanced. The area intended for investigation consists mainly of woodland and small plantations, and the party struck into it at once working down the side of the stream from Maltby Church to the Abbey, a distance of about two miles.

As might be expected, there was abundance of Celandine, Anemone, and Dog's Mercury in flower, but the best things were

the Green Hellebore frequently met with all the way down, the yellow Star of Bethlehem seen several times, and the Spurge Laurel coyly peeping in unexpected moments from the shade of the woods.

In spite of the rain the Abbey ruins were investigated, and a short detour was made by Stone Mill and the lower edge of King's Wood. *Viola odorata* (white) was found, *Saxifraga tridactylites* was seen in flower (on the wall by the mill), Wall-flower was in bloom on the walls of the Abbey, and literally acres of daffodils occurred on the edge of the woodland area close by. The Moschatel (*Adoxa moschatellina*) was also frequently seen in places of half shade; also Primrose (*Primula vulgaris*), Cowslip (*P. veris*), and Periwinkle (*Vinca minor*).

In the sheltered valleys of the two streams that meet by the abbey, the trees, especially Beeches, grow to a great size. Hawthorns are not mere shrubs, but trees, and the Yew, both within and without the woods, is abundant, growing in some instances to the height of its woodland companions. Good examples of the Box, whether indigenous or planted, were frequent.

MOSES AND HEPATICS—Mr. Snelgrove writes:—

Of the mosses only a very hasty gathering was made. *Hypnum molluscum* (fr) was very abundant, as also *Mnium undulatum*, *M. punctatum*, *Thuidium tamariscinum*, *Brachythecium rutabulum* (fr) *Hypnum cupressiforme* and *Eurynchium Swartzii*. There were also *Hypnum cuspidatum*, *Hylocomium squarrosum*, *Eurynchium praelongum*, *Fissidens taxifolium*, and *Autocornium androgynum*.

Of Hepatics, all taken among the Abbey ruins, I have *Lophocolea bidentata*, *L. heterophylla* and *Lophozia gracilis*, the two latter in fruit.

FUNGI—Mr. W. N. Cheesman, J.P., writes:—

The four hours' collecting produced about thirty-five species. This was further increased to over sixty by Messrs. Malone and Sanderson, who stayed over the week-end. The scarcity of large fungi was very noticeable and special attention was given to the collection of micro species, which were submitted to and determined by Mr. C. Crossland, who writes that of the sixty odd species collected the following twenty-five are new records for the Maltby district.

BASIDIOMYCETES.		
<i>Hypholoma Candolleianum</i> .	On dead wood.	<i>Hymenochaete tabacina</i> . On dead wood.
<i>Polyporus brumalis</i> .	On dead wood.	<i>Hydnum farinaceum</i> .*
<i>Fomes fomentarius</i> .	On dead wood.	„ <i>stipatum</i> .*
<i>Solenia fasciculata</i> .	On dead wood.	<i>Odontia fimbriata</i> .*
<i>Stereum rugosum</i> .	On dead wood.	<i>Peniophora laevigata</i> .*
		<i>Corticium laeve</i> .*

* Determined by Miss Elsie Wakefield, F.L.S.

Corticium violaceo-lividum.
Hirneola auricula-Judæ. Last
 year's growth.

PYRENOAMYCETES.

Hypoxylon multiforme. On fallen
 birch twigs:
Phyllachora graminis. On grass
 stems.
 " *pteridis*. On stems of
Pteris aquilina.
Byssosphaeria aquila. On rotting
 wood.
Lasiosphaeria ovina. On rotting
 wood.

DISCOMYCETES.

Peziza reticulata. On the ground.
 A large spring species.
Dasyscypha nivea. On decaying fir
 stump.
Sclerotinia tuberosa. In soil, stem
 one and a half inches long.
Orbilbia luteo-rubella.

PHYCOMYCETES.

Synchytrium mercurialis. On
Mercurialis perennis.

MYXOMYCETES.

Trichia contorta. Attacked with
Stilbum tomentosum.
Hemitrichia clavata.

LICHENS.—Mr. Wattam writes :—

The smoke from the furnaces of Sheffield and Rotherham has apparently sufficient effect to deter lichens growing in either abundance or luxuriance, and the specimens met with were generally of but meagre growth. None of the woods investigated yielded a single filamentous form, and even foliaceous forms therein were scarce. The following species, which are the first records for the district, were noted, viz :—

Parmelia saxatilis L., and form *furfuracea* Schaer, *P. omphalodes* Ach, *P. caperata* Ach, *P. olivacea* Ach. *P. physodes* Ach, *Physcia parietina* De Not, *P. stellaris* sub. sp. *tenella* Nyl; *Lecanora ferruginea* Huds, *L. irrubata* sub. sp. *calva* Nyl., *L. parella* Ach., *Pertusaria communis* D. C. form *rupestris* D. C.; *Cladonia pyxidata* Fr., *C. cervicornis* Schaer, *C. digitata* Hoffm., *C. macilenta* Hoffm; *Lecidea contigua* Fr., *L. confluens* Ach.

GEOLOGY.—Mr. C. Bradshaw, writes :—

On the journey from Rotherham to Maltby, stone lifting tackle was seen from time to time, showing where exposures of economically important Coal Measure sandstones could be studied about Wickersley and Bramley.

The route from Maltby to Roche Abbey was through the valley threaded by the Maltby brook. Careful observation of surface features lead geologists to surmise a junction between the Lower Magnesian Limestone, which occurs on both sides of the valley, and the Coal Measures beneath, though the latter are concealed by turf or other covering, save where the stream reveals a more or less satisfactory section.

As the distance from the Abbey was diminished, prominent crags and faces of the picturesque limestone commanded attention, and there was some discussion as to the origin of a character, which, for want of a better term, might be called 'honeycomb' structure.

Apart from their archaeological interest, contemplation

of the Abbey ruins, by some for the first time, proved an object lesson, testifying to the value of the local Permian limestone as a building material.

After lunch the geologists visited the well-known quarry just above the Abbey, and then the Maltby Main Colliery for the examination of spoil heaps. At the quarry referred to specimens of chalk-like dolomite rock were secured and its regular bedding was noted, as was also the effects of exposure on the surface of the stone, which soon wears a sombre grey aspect. Dendritic spots, probably of manganese dioxide, were observed to be prevalent in some parts, and along certain planes solution of the double carbonate had probably taken place, with subsequent deposition and crystallization. Leaving the Abbey quarry, a tramp of rather more than two miles brought the party to the coal pit in the seclusion of Maltby Wood. Here the Permian strata have been pierced, and the Barnsley seam of the Middle Coal Measures successfully reached at a depth of 820 yards. It was the shale over this coal seam brought to the surface, and deposited on the spoil heaps, which proved an attraction to the geologists, and the remainder of the day was spent in its examination, permission having been granted by the Manager, Mr. T. L. Soar.

The following were among the specimens collected:—

Lepidodendron sp. *Sigillaria tessellata* Brongt, *S. scutellata* Brongt, *Stigmara*, *Calamites* sp., *Annularia sphenophylloides*, Zenker, sp. *Sphenophyllum cuneifolium*, Sternb. sp. *Sph. majus*, Bronn, and leaflets of *Neuropteris gigantea* (?) Sternb. Septarian nodules of clay-ironstone were also seen among the pit debris.

MICRO-ZOOLOGY and BOTANY.—Mr. H. Moore writes:—

The search of Mr. G. Howard and myself in various ponds did not yield much, and inasmuch as no *Myriophyllum* was met with there are no tube-building Rotifers to record.

The following species were noted, viz:—

ROTIFERA.
Notholca acuminata.
Notholca scapha.
Synchaeta pectinata.

INFUSORIA.
Stentor polymorphus.
Euglena viridis.
Synura uella.
Actinophrys sol.
Arcella vulgaris.
Hydra fusca.

Also a few specimens of *Volvox globator* from Maltby Common pond.

W. E. L. W.

—: o :—

Mr. W. Denison Roebuck describes '*Limax cinereo-niger* var. *strobili* Lessona, new to Britain,' in *The Journal of Conchology*, for April 1st. The specimen was taken at Berkhamsted, Herts. In the same issue Mr. F. J. Musham has a paper on the land and freshwater mollusca of Iona.

In Memoriam.

REV. JAMES CONWAY WALTER.

(1831—1913).

ON more than one occasion the writer has had the pleasure of visiting the late Rev. J. Conway Walter at his Rectory at Langton, near Horncastle, and has pleasant recollections of his enthusiasm, and his many and varied interests. The Rectory was a veritable museum of Natural History and archaeological and sporting trophies. His garden and grounds contained other curios, living and dead; and his quaint little church was



Rev. James Conway Walter.

well decorated throughout by his own handiwork, for he was an expert wood-carver, and erected a pulpit, reading desk, etc., to the memory of his father, who was Rector at Langton before him.

A vigorous correspondent, he never tired of obtaining information, or imparting it. The pages of *The Naturalist* contain many notes from his pen. He took a prominent part in the meetings and excursions of the Lincolnshire Naturalists' Union, and occasionally visited Yorkshire on natural history rambles. He was President of the Lincolnshire Union in 1900, and the Transactions of that Society for 1910 contain his portrait and a brief account of his work.

He was a keen sportsman, and among his more substantial publications are 'Forays among Salmon and Deer,' 'Letters from the Highlands,' 'Fin, Fur, and Feather,' and 'Stray Leaves on Travel, Sport, and Animals.' Sometimes he used the pen-name of 'J. Conway.' He had also some reputation as a deer stalker, and as a disciple of Izaak Walton. He published the results of some curious experiments he made in hybridism.

Keenly interested in antiquarian matters, he did much, in the way of newspaper articles, addresses, and books, to popularize the study of archæology in its various branches, though never particularly specializing in any direction. In many respects he took up a similar position in Lincolnshire to what the late Rev. E. Maule Cole occupied in East Yorkshire.

His newspaper work was enormous, and many of his articles were reprinted later in book form. His chief contributions in this direction are 'A History of Horncastle,' 'Records of Woodall Spa and Neighbourhood,' 'Parishes Round Horncastle,' 'The Ayscoughs,' etc.

Though eighty-two years of age, his long letters showed that his mind was ever active. He was distinctly of the old school of 'all-round naturalists,' and his death has severed another of the few remaining links between the 'know something of everything' naturalist, and the more modern specialist who prefers to try to know 'everything of something.'

Readers of *The Naturalist* will join the present writer in regretting that the type of man referred to in these notes seems to be surely disappearing.

We are indebted to the Lincolnshire Naturalists' Union for the loan of the accompanying block. T. S.

At a recent meeting of the London Geological Society a paper on 'The variation of *Planorbis multiformis*,' by Dr. G. Hickling, was read by Mr. D. M. Watson. In the discussion Mr. A. S. Kennard opined that the species in question was not a *Planorbis*. Mr. Watson was ready to agree that the forms described did not belong to the genus *Planorbis*, 'but the name of the genus did not affect the point at issue.'

A further valuable gift has just been made to the Hull Municipal Museums Committee by C. Pickering, Esq., J.P., the donor of the new Museum of Fisheries and Shipping at the Pickering Park. It was recently represented to him that the new museum was already crowded with exhibits and he has kindly presented a strip of land stretching from the Hessle Road to the Pickering Park, and adjoining the present museum, for the purpose of extension.

The recently-formed Selby Scientific Society held a *Conversazione* at the Museum, Selby, on 17th April, when the President of the Yorkshire Naturalists' Union, Mr. H. Wager, F.R.S., gave an address on 'How Plants Perceive the Light.' Mr. W. N. Cheesman, J.P., is the first President of the Selby Society, and Mr. J. F. Musham is the Hon. Secretary. It is twenty years since the previous Selby Scientific Society existed, and as the new one has already a membership of nearly 100, its success is assured.

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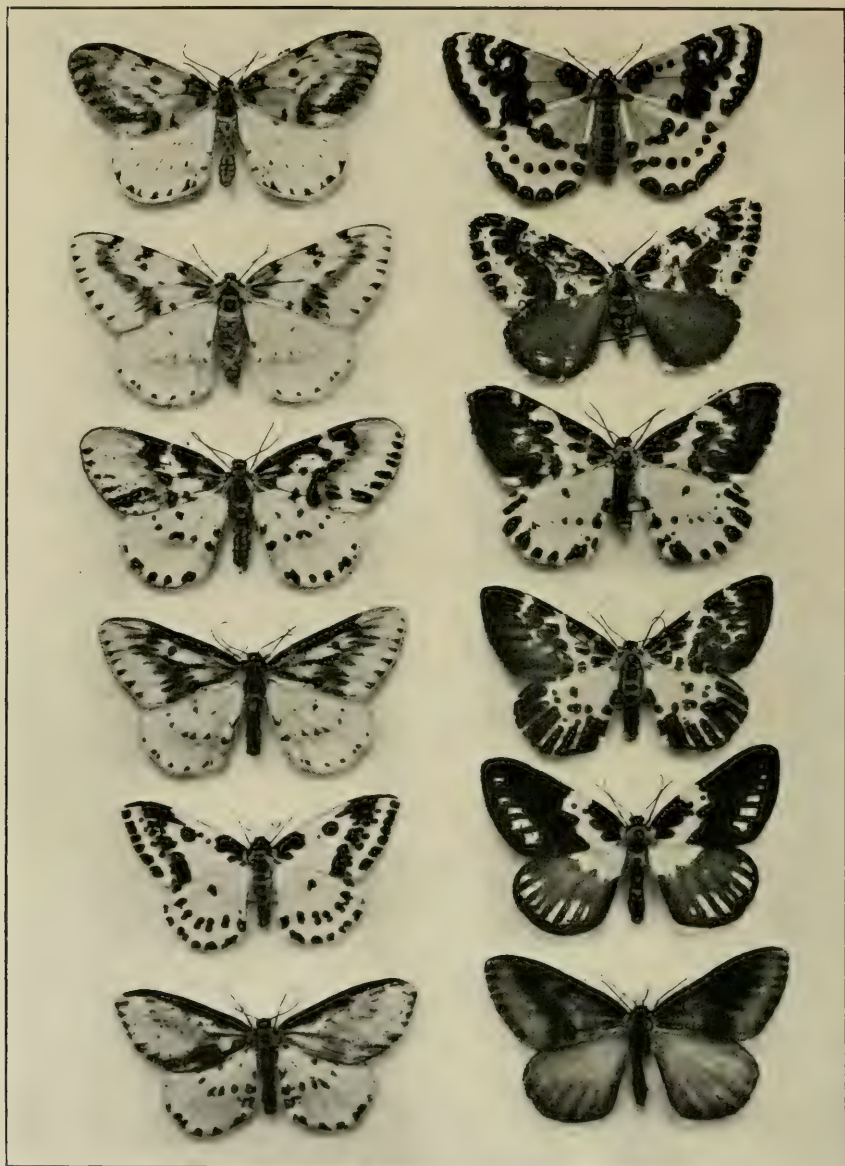
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- 1.—(♀) *ab. laticolor-radiata*. 2.—(♀) *ab. laticolor-lutea*. 3.—(♂) *ab. albispatiata*.
 4.—(♂) *ab. gloriosa*. 5.—(♂) *ab. melanozona*. 6.—(♂) *ab. nigrocostata*. 7.—(♀) *ab. flavipalliata*.
 8.—(♀) *ab. nigrosparsata*. 9.—(♂) Specimen with outer margins of fore wings heavily blackened; central fascia brilliant yellow. 10.—(♂) Specimen with both fore and hind wings deeply irrorated with intense black; central yellow fascia much diminished. 11.—(♂) *ab. varleyata*. 12.—(♂) *ab. nigrosparsata*.

NOTES AND COMMENTS.

THE BRITISH ASSOCIATION.

The Eighty-third Meeting of the British Association for the Advancement of Science will be held in Birmingham from September 10th to 17th, under the Presidency of Sir Oliver J. Lodge, D.Sc., LL.D., F.R.S., Principal of the University of Birmingham. The Town Hall will be the Reception Room, the various Section Rooms will be in the surrounding buildings, and the evening meetings will be held in the Central Hall. During the Meeting the principal scientific and literary institutions and clubs in the city will be open to visitors, who will also have the opportunity of inspecting a number of representative manufactories and other places of interest in the district. Excursions are being arranged for the Saturday to Stratford-upon-Avon, Charlecote Park, and Warwick Castle; Coventry, Stoneleigh Abbey, and Kenilworth Castle; Banbury, Wroxton Abbey, Compton Wynyates, and Broughton Castle; Bromsgrove, Hewell Grange, Grafton Manor, Droitwich, Hanbury Hall, Mere Hall, Westwood, Salwarpe Court, and Hartlebury Castle; Tewkesbury, Deerhurst, Bredon, Woolas Hall, Pershore, Evesham, and Abbey Manor; Worcester; Lichfield and Wall; Sutton Coldfield and Oscott College; the Forest of Arden Villages—Solihull, Knowle, Henley, Wootton Wawen, Alcester, and Coughton Court; and Malvern, British Camp, and Madresfield Court.

NOMENCLATURE AGAIN.

In the *Entomologist's Monthly Magazine* for May Mr. D. Sharp states that the specimen which he had recently described as *Haliplus brownei* should have been named *Haliplus browneanus*, and *H. multimaculatus* was so described in error, being a *lapsus calami* for *H. multipunctatus*. It is a pity the proofs were not carefully read, as once a new name is given to the world it is a difficult matter to alter it. We don't like these quick nomenclatural changes, (usually referred to as 'D. Sharp's').

A PUZZLE.

The following, also from the pen of Mr. D. Sharp, appears on the very next page to that just referred to, but we confess we are not quite able to follow it:—'*Hydroporus bilineatus* Sturm in England.'—In 1903 the late Mr. Chitty introduced this name to our catalogue, but in Canon Fowler's new volume Mr. Chitty's species is treated as being *H. hopfsgarteni* Gerh., and considered to be distinct from *H. bilineatus* Sturm. In both these respects I believe Fowler is quite correct, and if so, it would appear that the latter must be erased from our catalogue. This, however, is not the case, as the specimens recorded from Sheppey by Fowler as *hopfsgarteni* are the true *bilineatus* Sturm!

ANOTHER MUDDLE.

In the very next paragraph Mr. G. C. Champion finds that since he recorded *Stenus oscillator* for Killarney he has searched among his old duplicates and has found various small *Stenus tarsalis* so like *S. oscillator* that 'it is more than probable that the latter will prove to be a small form of that variable species.' And further on he writes: 'The Killarney insect recorded by me as *S. oscillator* cannot be separated from small *S. tarsalis*.' All this means, we presume, that a little search among the author's own material, possibly causing a month's delay in publishing the 'record,' would have prevented the error and confusion.

STILL ANOTHER WRONG RECORD.

A page or two further on, in the same journal, and we find that Mr. R. C. L. Perkins writes on '*Andrena niveata* Friese, probably wrongly recorded as British,' and presumably by Mr. Perkins. Anyway, it seems that Professor Alfken doubted the occurrence of *niveata* in Britain, and sent Mr. Perkins specimens of '*A. schenckella* Pérez (= *nana* Schenck, Schmiedn. nec Kirby) [!]' which entirely agree with British specimens supposed to be *niveata* taken by myself. . . . It is therefore very doubtful whether *A. niveata* is a British species at all, as my specimens, taken in such different localities as Suffolk, Oxford, and Devon are certainly to be referred to, as *A. schenckella*.'

MANCHESTER ENTOMOLOGISTS.

The Tenth Annual Report and Transactions of the Manchester Entomological Society* contains a good report of a good year's work. Besides particulars of the various exhibits at the Society's meetings, it includes 'Local Records'; Descriptions of *Abraxas grossulariata* (with plate), by Mr. B. H. Crabtree; Mr. H. S. Leigh gives 'some particulars, a few of which have been previously published,' respecting 'the life-history of the Leaf-Insect and the Mantis'; Mr. J. H. Watson gives 'Notes on the Actias Group of Saturniidæ and Descriptions of two new Genera,' and 'The Genus *Philosamia* (Grote) and its Hybrids.' We are indebted to Messrs. Tait and Crabtree for the loan of the interesting block shown on Plate XI.

WILD LIFE.

What must surely be perfection in the way of an illustrated natural history journal has recently been issued, with the above title, under the editorship of Mr. Douglas English, assisted by Mr. J. Simpson as Art Editor. The publishers

* Manchester, 1913, pp. 90. 1s. 6d.

are not named, but the paper can be obtained at Dudley House, Southampton Street, W.C. The magazine is a large quarto, printed on art paper, and many of the numerous illustrations are on tinted mounts. Each part contains sixty-six pages.

NATURE PHOTOGRAPHS.

The parts already issued contain a wonderful series of photographs from nature, care being taken to exclude anything in the form of a 'faked' print. Perhaps the most remarkable are Mr. R. B. Lodge's 'Vultures' and 'Eagles.' Dr. F. Ward follows close with his 'photography under water.' The Editor, Mr. Douglas English, illustrates and describes sand wasps, the wild cat; and birds, reptiles, etc. are portrayed by M. D. Haviland, L. E. Adams, K. G. Blair, E. G. Boulenger, A. Taylor, Ethel Rolt-Wheeler, G. D. Ferguson, A. R. Haigh-Brown, R. Hancock, N. Gale, W. Farren, H. Murchison, and others. We only hope the journal may have the success it certainly deserves, but we sadly fear that the price of thirty-four shillings per annum is rather more than the public cares to pay—even for so fine a publication.

WATER 'DIVINING.'

In view of the remarks we recently made in reference to water 'divining,' it is of interest to note that *The Sanitary Record and Municipal Engineering* has published the report of the Committee of Scientists who were present at the water divining tests held recently at Guildford by that journal. Their general conclusions are: (a) 'That whatever sensitiveness to underground water may exist in certain persons, of which some evidence has been given, it is not sufficiently definite and trustworthy to be of much practical value'; (b) 'Moreover, the lack of agreement with each other shows that it is more a matter of personal mentality than any direct influence of the water. The diviners, as a rule, confine their attention to small streams of water, and as there are few places where these cannot be found they may well show a large percentage of success.' It will be remembered that a dozen 'dowsers' took part in the test. One of the sites to which they were taken was the top of a reservoir masked by a lawn, but none of them detected the fact. Two sewers, and an exceedingly powerful spring, which were known to lie under the water-finders' other sites, they also failed to discover. The Committee testify to the dowsers' honest faith in their own powers, but the report appears finally to dispose of any hope of proving the reality of those powers by scientific methods.

MOORLOG.

In the *Anmälanden och Kritiker* (Band 34. Heft 7. pp. 809-812), published in Sweden, Dr. H. Munthe reviews the

papers on Moorlog by Messrs. Whitehead, Goodchild, and Stather, a note upon which has already appeared in these pages.* Dr. Munthe also adds some valuable observations of his own, a translation of which we have pleasure in giving for the benefit of English workers.

PEAT FROM THE KATTEGAT.

Dr. Munthe states :—‘ The submarine peat on and around the Dogger Bank causes one to think of the discoveries described by Mr. E. Erdmann, of large pieces of peat from the bottom of the Northern Kattegat, at a depth of 35·47 metres. A comparison between the flora in this peat and that in the Moorlog shows, however, a remarkable dissimilarity, the former containing, among others, fragments of such southern species as oak, lime, and elm, while none of these species are recorded from the Moorlog, the latter probably being formed in a colder climate. The possibility still exists that remains of a part of the last-named species might be found in the Moorlog, as there has not been any extensive examination of the fragments.’

DATE OF KATTEGAT PEAT.

‘ Mr. Lagerheim considers that the Kattegat peat dates from the *Litorina* period, or is possibly still more recent. According to my opinion there is nothing to contradict its dating from the *Ancylus* period.* As regards the age of the North Sea peat referred to, this may be assumed to date from the end of the late Glacial period, or possibly from the beginning of the *Ancylus* period, and to practically the same period the underlying marine clay may be dated, the most southern shell which it contains apparently being *Rissoa membranacea*, which at the present time, according to Mr. G. O. Sars, does not extend further than to the west coast of Norway. There is also a possibility that the North Sea layers are of inter-glacial age.’

FURTHER WORK NECESSARY.

‘ The fairly general existence of Moorlog on the bottom of the North Sea justifies the expectation that a more minute examination may result in the same peat layers being found in the Northern Kattegat also, a matter which I hope, in the near future, to have an opportunity of clearing up. Anyway, it is very desirable that a geological examination of submarine parts of the seas in Northern Europe nearest from the English, German, Danish, Norwegian, and Swedish sides should be earnestly undertaken and carried out according to a common plan.’

* *The Naturalist*, 1912, pp. 138.

† The lowest bed of the post-Glacial series.—ED.

THE AGE OF MOORLOG.

With regard to Dr. Munthe's opinion that the age of the Moorlog may possibly be 'interglacial,' on this point we respectfully beg to differ. We are by no means sure of evidences of a mild interglacial period, so far as the beds exposed in East Yorkshire indicate, and certainly a careful examination of the Moorlog, its underlying clay, and their botanical and zoological contents, give no such indications; in fact all point to the deposits being of post-glacial date.

POST-GLACIAL CLIMATIC CHANGES.

Bearing upon this most interesting topic, we should like to draw attention to a valuable work, 'Die Veränderungen des Klimas seit dem maximum der Letzten Eiszeit' ('Climatic Changes Since the Last Ice Age'), a collection of papers read before the Committee of the Eleventh International Geological Congress at Stockholm, and sold for a sovereign by Generalstabens Litografiska Anstalt, Stockholm (lviii. + 459 pp., 4to). In this are given reviews of the subject, by various authorities, covering all parts of the world, and some of the more interesting are printed in English.

ENGLISH EVIDENCE.

For 'Gross-Britannien' Mr. G. W. Lamplugh gives 'Notes on British late-Glacial and post-Glacial deposits,' in which he deals with the subject with his characteristically commendable caution. He concludes that 'without a critical discussion of the details . . . it may seem presumptuous to question the schemes of post-Glacial vicissitudes which have been proposed by other investigators. With regard to these schemes . . . the most usual attitude among British geologists is one of neutrality tinged with scepticism. In my own case the scepticism at present outweighs the neutrality.'

'INTERGLACIAL' DEPOSITS.

On the question of 'Interglacial' periods Mr. Lamplugh is very definite. He says: 'I have been driven to conclude, after many years' field work on the drifts in various parts of the British Islands, that there is no clear evidence for the supposed separate glaciations and warm inter-Glacial epochs, but on the other hand there is strong evidence that the main ice-sheets persisted throughout the Glacial Period, and only their margins oscillated widely. As a corollary to this result, I am inclined to suppose that the post-Glacial deposits have been accumulated during progressive amelioration of climate.' The volume contains a very fine Introduction, or 'Vorwort,' to the whole subject, by Dr. Gunnar Andersson.

FIELD NOTES.

LEPIDOPTERA.

Yorkshire Micro-Lepidoptera.—In a paper on Lepidoptera taken by himself in the Middlesbrough district during 1912, published in the *Entomologist's Record* for April last, Mr. T. A. Lofthouse records four micros as new to the Yorkshire list: These are *Grapholitha cinerana*, *Pædisea rufimitrana*, *Tinea weaverella*, and *Argyresthia atmoriella*. A fifth species, *Retinia turionana*, which Mr. Lofthouse records as new, had already been taken by the Rev. C. D. Ash on Skipwith Common, near Selby, and is included in the Supplement to the List of Yorkshire Lepidoptera.—GEO. T. PORRITT, Huddersfield.

—: o :—

FUNGI.

Fungi near Scarborough.—A very fine specimen of a rare spring fungus, *Mitrophora gigas* Batsch, was found on the 15th May by Miss E. M. Le Tall, near the Racecourse, Scarborough. This species belongs to the Morel family, and has only once previously been recorded in Yorkshire, from Masham in Vice-County, N.W.

In February last I found in Raincliffe Woods, Scarborough, some of the dry leaves of *Rhododendron ponticum* L. covered with a small fungus, *Lophodermium rhododendri* Ces., one of the Hysteriaceæ or Gaping Fungi. The rhododendra affected, which are in a damp, unfavourable situation in the wood, show at first reddish spots on the living leaves, and afterwards the mature black elliptical ascophores are produced on the fallen leaves. This species, which is new to Yorkshire, has only one previous record for Britain, and that from the county of Surrey. It is not yet described in the British floras, and the writer is indebted to Mr. Chas. Crossland for specific determination. A full description will be included in the next list of new Yorkshire species.—T. B. ROE, Scarborough.

—: o :—

CRUSTACEA.

Euthemisto compressa.—Millions of these arctic crustaceans were washed up on the shore yesterday and to-day. In some places they were in drifts like snow, three or four inches deep and extending for distances of a hundred to two hundred yards, visible at a distance of a quarter of a mile. The sands, from high- to low-water mark were strewn, and the rock pools were literally alive with them swimming—generally on their sides. I have frequently observed great quantities of similar creatures and of various species, but never before have I seen such immense numbers, and the appearance of the beach might be compared to that on a winter's day after a fall of snow.—THOS. H. NELSON, Redcar, May 4th, 1913.

Naturalist,

THE FISHES OF THE LOWER WHARFE BASIN.*

G. WADDINGTON.

THE following notes have reference to the lower half of the River, though no actual line of demarcation can be fixed except at the eastern extremity.

There are only a few references to the higher reaches of this stream, as my experience does not extend to within some little distance of its source. One writer seems to have made a special study of the Ichthyology of Upper Airedale,† but although no river in Yorkshire is so well known to naturalists, anglers, and sportsmen generally, I have not been able to find a similar account of the fishes of the River Wharfe.

In the Lower Wharfe Basin are both migratory fishes, such as the Salmon, Eel, and Flounder; and fishes which are not capable of existing in salt water, nor have the desire of attaining the sea if they could do so.

The following is a catalogue of Fishes found in the Lower Wharfe Basin, based on Günther's classification:—

FISHES FOUND IN THE LOWER WHARFE BASIN.

<i>Perca fluviatilis</i> ,	River Perch.
<i>Acerina cornua</i> ,	Ruffe or Pope.
<i>Cottus gobio</i> ,	Miller's Thumb.
<i>Gasterosteus aculeatus</i> ,	Common Stickleback.
<i>Pleuronectes flesus</i> .	Flounder.
<i>Barbus vulgaris</i> ,	Barbel.
<i>Gobio fluviatilis</i> ,	Gudgeon.
<i>Leuciscus rutilus</i> ,	Roach.
„ <i>cephalus</i> ,	Chub.
„ <i>vulgaris</i> ,	Dace.
„ <i>phoxinus</i> .	Minnow.
<i>Tinca vulgaris</i> ,	Tench.
„ <i>var. aurata</i>	Golden Tench.
<i>Salmo salar</i> ,	Salmon.
„ <i>fario</i> ,	River Trout.
<i>Thymallus vulgaris</i> ,	Grayling.
<i>Esox lucius</i> ,	Pike.
<i>Anguilla vulgaris</i> ,	Eel.
<i>Petromyzon fluviatilis</i> ,	River Lamprey.
<i>Acipenser sturio</i> ,	Sturgeon.

THE RIVER PERCH can be identified by its brilliant colouring and strong spinous rays in the primary dorsal fin. The

* Read at a meeting of the Vertebrate Section of the Yorkshire Naturalists' Union.

† The Fishes of Upper Airedale. Whitaker, Bradford Scientific Journal, July, 1907.

ventral, anal, and caudal appendages are generally tinged with deep vermilion, and the characteristic colour varies from bluish olive, to brassy yellow in mature and well grown specimens. The Wharfe should be an ideal river for these fish, but unfortunately the species appears to be limited to the lower reaches entirely. I have taken specimens at Tadcaster, but above this point where the dilution of deleterious matter becomes lessened, it is only to be met with in ponds, etc., near the river side.* This seems to indicate, that at one time, probably before we had to contend with sewage contamination; it was plentiful as far up as Otley. In the early part of 1912 a pond near Ben Rhydding containing a large quantity of small Perch was emptied, and the fish eventually found their way into the river.†

The fecundity of the Perch is extraordinary, more especially in semi-stagnant waters, though in this country it seldom attains to a weight of more than three pounds. It is a voracious fish, particularly when small and predatory in its habits. Its food consists of gudgeon, minnows, and other small fry, besides worms, crustaceans, etc. It is readily taken on the rod, and, being gregarious, it is often caught in large numbers. When the Perch is well grown its flesh is held in high esteem.

The species spawns from the middle of March to the middle of April and soon afterwards regains its strength and condition. Though a hardy fish and easily transported from one locality to another (in the winter months requiring only a covering of damp moss in place of its natural element) it is nevertheless extremely susceptible to foreign or poisonous substances which may find their way into the water, and from this cause very often succumbs.

The large Perch of Malham Tarn in Craven are famous. Huxley described them as exceedingly black, and generally found to be blind.‡ By some authorities this is stated to be due to a parasitic disease to which the fish is addicted. In enclosed waters the Perch does not appear to thrive in company with the Roach.

THE RUFFE OR POPE closely resembles the Perch in form, but seldom grows to a greater length than four or six inches.

The colour is yellow to olive. It can be caught on the rod all the year round, and like the Perch, prefers a quiet swim with a gravel bottom, to the strong streams. From the

* Some very good specimens are taken in the river above this point, especially in the neighbourhood of Harewood.—ED.

† These particular Perch were not indigenous to the locality, but were introduced by an angler several years ago from the Aire valley—the parent stock consisting of about forty or fifty specimens.

‡ This is hardly so at the present day.—ED.

anglers' point of view the fish has little value. It appears to be well distributed in Wharfedale, and can be found as far up the valley as Otley.

THE MILLER'S THUMB can be distinguished from the other members of the order by its large and flattened head. It is remarkable for its voracity, is active in its habits, and lives in solitude in the darkest, most sluggish and deepest parts of the river. In this country it never grows to a greater length than five inches. It has no scales, and seems to prefer soft or muddy ground to a clear and sandy bottom. When disturbed, it darts away and rapidly obscures itself in a cloud of mud. Where the roots of overhanging trees have been exposed to the action of the current, the Miller's Thumb or Bullhead can generally be found. It varies somewhat in colour, but as a rule it has very dark brown or even black markings on a dirty white base. Looking at the fish from the front, it has a most repulsive appearance, owing to the superior position of the eyes and the disproportionate gape of the mouth.

THE STICKLEBACK is rarely to be met with in the River Wharfe itself, but it is fairly common in the pools and ditches which lie in its basin. In Wharfedale at any rate, it appears to prefer stagnant to running water.* It spawns in May and June, and at this time of the year the Stickleback constructs a nest the better guidance and accommodation of his prospective for partner, in which she deposits her eggs. The male fish then assumes a blood red colour on the throat and breast. Although the Stickleback is one of our smallest fishes it is extremely pugnacious. Like the Perch it is gregarious and with suitable traps—not necessarily baited—may be taken in large numbers.

THE FLOUNDER. This migratory fish occurs in the Wharfe from Tadcaster downwards.

It ascends rivers for long distances, is very prolific, but never attains a very large size in fresh water. Its flesh is of fine flavour. It possesses in a remarkable degree the power of adapting itself to its environment by assuming the colour of the bottom. This fact makes it indistinguishable from the rest of its surroundings, except to a very experienced eye.

The colour is generally brown or drab, which may be relieved somewhat by the superposition of orange or very dark brown spots. Its food consists of worms, small fishes, and other animal substances. It ascends estuaries to spawn; which process generally takes place from December to February. In Yorkshire they are known as 'flatties.'

At one time large numbers were caught by means of a three pronged spear which was thrust into any likely place.

* In the neighbouring valley, Airedale, the Stickleback is plentiful in the river, and as Mr. Booth has pointed out, it forms the principal food of the Kingfishers.—ED.

THE BARBEL, from a sportsman's point of view, is one of the heaviest and the most valuable of the non-migratory fishes found in the Wharfe. They are summer fish and become torpid and lie together in a compact mass during the colder part of the year, and in the deepest water they can find. Though specimens have been taken in the Derbyshire Derwent, and the Thames, in December, in Wharfedale at any rate it is comparatively useless to expect them to take a bait between October and May. They are exceedingly powerful, and from July to September are found in the swiftest and most broken water.

In the Wharfe it rarely exceeds eight and a half pounds in weight. It spawns in its fourth year, from May to June, though this event may be delayed somewhat by extraneous or climatic influences. It is a remarkable thing that nothing whatever is known of small Barbel; during the whole of the writer's experience he has never caught nor known of a specimen being caught of less than half-a-pound in weight.* Barbel, when young, are by some supposed to live in association with Gudgeon; as they grow larger they leave their early companions and join the parent stock. The fish is gregarious in its habits, and unable to resist the power of strong light. At one time it used to be the common practice to take advantage of this weakness—parties provided with torches and armed with suitable spears used to sally forth at night and slay large numbers; the streams in consequence soon became denuded of them. This method of capture is still known in Wharfedale by the name of 'blazing.' The weather cannot be too hot, and the water too low for this fish. In August, 1911, a year memorable for fine weather, I took one hundredweight and a half of Barbel in four days' fishing.

In Yorkshire this fish is confined to the rivers of the central plain, and Day mentions that it was largely taken at Sheffield. We doubt if this is the case now. He also states that it is not found in the Yorkshire Derwent, in spite of the fact that at Bubwith very fine specimens have been captured within recent years. It can be caught from Poole downwards, and the lower portions of the rivers yield the heaviest fish.

In 1912, great quantities of fish of all kinds were destroyed the Wharfe, between Ilkley and Ben Rhydding, by an accidental discharge of gas liquor, as already referred to in this journal. Among the number of dead were five Barbel, weighing from four to six pounds apiece. Their presence in the river at this point had, up to then, remained quite unsuspected. The Strid is likely to contain Barbel, but we

* I have several times caught small Barbel the size of a good Gudgeon, and, in every case, in Gudgeon swims.—R. F.

have no means of ascertaining this. As the species is dormant during the spawning period generally assigned to the Salmonoid races, it is quite harmless in a trout stream.

THE GUDGEON is distributed throughout the Wharfe Valley, and may be found as far up as Grassington. In shape it resembles the Barbel, but never attains a greater weight than a few ounces. It possesses one barbel at the corner of the mouth as against a total of four in its greater prototype. It grows to a larger size in lakes or ponds, than in the streams, and can be taken on the rod during most of the year. At spawning time, the gudgeon collects in large shoals and can be readily caught on the shallows with a small net, and often by the hand only. Cooked in a similar manner to Whitebait, they make an excellent and edible dish. They are in great demand among Pike fishermen as a live bait, and on the Eden is more commonly used than any other in "spinning" for salmon. It is readily caught with a small red worm, or with gentles; more especially if the water is naturally, or even artificially discoloured or disturbed.

THE ROACH is perhaps the best known fish of any in the British Isles. It lives in association with Bream and Rudd, and others of its kind, often producing hybrids with the former. In suitable waters it increases rapidly in numbers, the fish then remaining small and apparently ill fed. The Roach seldom grows to a greater weight than two pounds, large ones usually being taken from rivers. In this country the roach spawns in May, and in ponds even as late as June. The eggs form excellent food for the Trout, and Pike will take the young fish readily. The Roach is more frequently met with in the sluggish portions of the Wharfe, though above Collingham it is rarely taken in great quantities. Though Wharfe Roach never reach the size of Thames fish, they are well proportioned and brilliantly coloured. The best time of the year in which to angle for them is during the autumn and winter months, and baits such as gentles, paste, etc., are generally used.

THE CHUB can be distinguished from the Roach by its larger head and the wider gape of the mouth. It is a powerful fish, and specimens have been taken in the Trent weighing as much as seven pounds. At certain times of the year it can be taken with the minnow either employed as a live bait or by "spinning." The Chub is very shy, and caution has to be exercised in its capture. It spawns in May, and afterwards continues to frequent the scours or rapid streams, and feeds on worms, insects, etc., in the swims. Chub live for eight or nine years, and at the third year will weigh from three-quarters to one pound. From the third year its growth is rapid, more especially if the food supply be plentiful. Its appetite is

insatiable, and, failing animal matter, it will take bread, cheese, and has even been known to feed on cherries, like the Carp. The Chub abounds in the Wharfe, and can be caught from Ben Rhydding downwards, specimens weighing over three pounds, however, are uncommon, the usual size rarely exceeding two pounds. No doubt if introduced into the Wharfe from other watersheds the average weight would soon increase.

THE DACE closely resembles a small Chub, but the lesser mouth, the steel blue colour of the back, and the bluish cast on the sides of the fish after death, distinguish it from that of the former. The dorsal and caudal fins are grey black, the pectoral and anal fins are said to be pale red, but in the Wharfe are generally found to be brown yellow. It frequents the shallow streams in the warmer weather and chooses the deeper water for its winter quarters. It very rarely exceeds a pound weight. It spawns in May or June, and at this time Dace, like Barbel, betray their presence by partially turning over on their sides. The Dace occurs in the Wharfe from Burley to its confluence with the Ouse, and it is found in large numbers at Harewood and Woodhall Bridge. Fine specimens have been caught at Collingham weighing as much as fourteen ounces.

THE MINNOW is the most widely distributed of all the fishes in the Wharfe Basin. It infests every eddy, and the quiet portions of the river afford it a home. Its colour varies to harmonise with its environment. It provides an unlimited food supply for the fishes with which it is associated. It buries itself in the mud during the winter and reappears again at the commencement of the spring, apparently none the worse for its long fast. It spawns in June, at which time both sexes develop small tubercles, chiefly on the upper part of the head.

THE TENCH is adapted for a muddy environment, but it is one of the most beautiful of our fishes, its golden green colour shining through the thick coat of mucus. It is very seldom caught in the winter months, and during the summer is taken with difficulty. The best bait is unquestionably the worm. When Tench are transferred from the water to the basket they will live for many hours if left unharmed. In winter both sexes bury themselves in the mud to a considerable depth, where they lie until the commencement of more open weather. A pond which in winter is quite clear and in summer becomes turbid is probably inhabited by Tench. A weight of four pounds is seldom exceeded, and ponds should be stocked with care, or the fish remain small. We have no record of this fish having been caught actually in the Wharfe itself, but it certainly exists in a number of ponds in Wharfedale.

such as those near Ilkley, at Hollin Hall, and Compton, where it was introduced about seven years ago.

The Golden Tench, merely a semi-albinoid variety of the Common Tench, is found in one of the Fewston Reservoirs, where it was placed by Lord Walsingham.

THE SALMON. The Wharfe cannot be called a Salmon river, as these fish do not exist in sufficient quantities to make it worth while angling. At certain times, however, examples may be seen rising in the pools at Thorparch and Tadcaster, and even ascending the weirs at these places during a heavy run of water. It has been reported that Salmon smolts have been caught at Ilkley, though this requires verification. Though the Salmon is caught on the rod by fly fishing, spinning, or with the prawn, it is doubtful whether it feeds in fresh water. The stomachs of fish which have been recently killed have been carefully examined for traces of food, and in no case has any such been found.

THE RIVER TROUT. Seeley asserts that there are 'two principal forms of the River Trout,' one distinguished by Günther as *Salmo gaimardii*, the other *Salmo fario* var. *ausonii*, by Cuvier. Whether both these forms exist in the Wharfe, or merely the one (in all probability the first), is of little consequence, as the chances of being able to separate the one from the other are very remote, owing to the difficulty of ascertaining whether the specimens are introduced or genuine natives of the streams. As the *S. gaimardii* is generally considered to be characteristic of the northern rivers this variety may be taken as typical of *Salmo fario*, as it certainly was the fish described by Linnaeus. The River Trout is the most valuable of the Yorkshire fishes, its sporting qualities and the fact that it is at the same time edible, making it the principal game fish of the county. The males can be easily distinguished from the females by their longer head. Its food consists of flies, larvæ, worms, and other such substances, and the larger fish will take minnow with avidity. The heaviest fish feed almost entirely through the night. The size of the Trout varies within wide limits, but the examples from typical northern streams generally average half a pound in weight. Much heavier fish are caught, but these are usually taken from the more sluggish and deeper portions of the river, and probably are examples of the variety *ausonii*, which really belong to the waters of the southernmost portions of Europe and the British Isles.

The Trout of Yorkshire are wanderers, whereas the fish of the lower reaches of the southern streams take up their position and will remain in their favoured location until the approach of the colder weather. In rivers such as the Eden, famous for the purity of the water and its association with a

limestone formation, no amount of fishing appears to denude the streams of its inhabitants, but in waters which are subject to sewage contamination, artificial stocking has to be employed, sometimes on a very large scale, to produce satisfactory results. The Trout occurs from the source of the Wharfe to as far as Tadcaster. It is found in abundance at Grassington, Bolton Abbey, and Ilkley, but in the lower portions of the river is not by any means as plentiful as one would desire, though the fish in the lower reaches are finer in flavour, better proportioned, heavier, and more handsomely coloured than those above Otley. At Collingham examples weighing a pound are not uncommon. Hofland mentions that at Harewood a fish was taken (1830-40) which weighed nearly four pounds, and quite recently a specimen of two pounds fourteen ounces was recorded from Linton. The present writer has had very fine specimens from the neighbourhood of Thorparch. Attention has been drawn to the superlative colouring of these fish from the lower reaches, and in my opinion they form part of the original stock indigenous to this stream, and as such have so far remained unimpaired by mixed blood from the hatcheries. It is quite possible that if the weirs at Tadcaster, Boston Spa, Thorparch, and Wetherby were made available for the passage of the Trout in their autumnal ascent to the upper waters, we should eventually be able to take them in larger quantities. Seeley says that 'one form of disease to which Trout are liable, the nature of which is unknown, is characterized by an increase in the size of the head and a wasting of the body.' This is often noticed in Wharfe fish, as is also the presence of lice, which attach themselves to the external surfaces, more particularly during the hot weather. In age the Trout may live from fifteen to twenty-five years.

THE GRAYLING prefers the more gentle portions of rivers, and the lower half of the Wharfe, where it exists in large numbers, is well adapted for its home. Until recently the Grayling was a local fish, and principally confined to some few rivers of the central plain east of the Pennines. It has been suggested that it was introduced from abroad by the monks, as it is usually found in rivers upon the banks of which are the remains of religious foundations of Cistercian origin. This supposition, however, is open to doubt, as the transportation of the fish is very difficult. In some parts of the country weights of five pounds are recorded, though examples from the Wharfe weighing above a pound are comparatively rare. Should the water be pure they increase so rapidly that large rivers are well known to have been stocked by the introduction of some half-dozen fish. The Grayling feeds on the surface all through the year, though it is most easily captured on the artificial fly in the months of October and November. The

neighbourhood of Woodhall Bridge, Harewood, and Thorparch is famous for the number of Grayling. At Tadcaster and beyond, where the river becomes deeper, it is not found in any large quantity.

THE PIKE or Jack is the most voracious of our fresh-water fishes, and will attack and devour anything from a waterhen or live rat to one of its own kind. It grows to a weight of thirty pounds, though examples of forty pounds have certainly been taken. Pike of eighteen and twenty-one pounds weight have been taken in the Wharfe, though this river is not particularly famous either for the number or size therein contained. The Pike is rarely found above Harewood Bridge, and is met with more commonly at and below Thorparch and Tadcaster, where it is taken on the live bait or by spinning. It prefers the quietest portions of the river to the rougher parts, and during floods will often wander so that after the waters have subsided, small ones may be occasionally found stranded on the land near the riverside.

EELS differ from other migratory fishes in that they feed and grow in the rivers and descend to the sea to spawn. They grow to a weight of about five pounds, though specimens from the Fen country have been taken weighing from ten to twenty pounds. The females are generally much larger than the males, and when about to leave the river for the spawning ground both sexes assume a brilliant silvery colour on the under surface. The Eel is probably the hardiest fish of any in the British Isles, and it has been known to live for many weeks in the damp mud of dried-up ditches. Eels are fairly numerous in the Wharfe, though they do not frequent the river in such large numbers as is the case of the streams which fall into the Bristol Channel. Specimens of a pound weight are not uncommon, and in the neighbourhood of Tadcaster, and at Ulleskelf, fish of larger proportions may be taken. We understand that at one time a regular Eel fishery existed at the latter place.

THE STURGEON is limited to the northern hemisphere, and its geographical distribution is nearly identical with that of the Salmon. It is the largest of the freshwater fishes, and occasionally exceeds a length of fifteen feet. In Britain they are not common, but in Asiatic Russia they are found in large numbers in most streams. In England the Sturgeon is a Royal fish. When caught in the Thames above London Bridge it is claimed and presented by the Lord Mayor to the Sovereign. It is very seldom that examples are taken in the Wharfe. Many years ago one found its way into the Leeds market from somewhere below Tadcaster, and in 1843 or 1845 a live Sturgeon weighing sixteen stones was recovered by two fishermen whilst netting for Salmon between

Riccall and Wharfe Mouth. It was tied to a stake by a loose rope and kept alive for some little time and exhibited. It was subsequently hawked about the neighbourhood at an approximate price of fourpence per pound.

THE LAMPERN or River Lamprey has been caught in the Wharfe in April and May by the hand alone, being attached to the stones which litter the river bed wherever there was a gentle run of water. In England the Lampern reaches a length of fifteen inches, but examples from the Wharfe average ten inches only. It is said to spawn in March or April, and after this process has been completed, usually dies. In the winter it ascends the Wharfe in large numbers, and during floods will find its way into sluices and the backwash of water wheels. When the river has again taken up its normal level they fall back into the river. Many, however, are left high and dry on the banks, and become the prey of the rats which infest the environs of the weirs, the adjacent mills, and their outbuildings.

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Comparative Anatomy of Vertebrates, by J. S. Kingsley. London: John Murray, x. + 401 pp., price 12s. net. This work is by the Professor of Biology at Tuft's College, Mass., and is an unusually thorough text book. The subject in its various ramifications is exhaustively dealt with, and especially full and complete is the description of the vertebrate skull. A prominent and welcome feature is the wealth of clear and well-drawn illustrations—nearly four hundred. Another valuable feature, which will be particularly appreciated by the student, is the Bibliography of important monographs, under various heads. There is also a valuable list of 'Definitions of Systematic Names.'

The Moorlands of North-Eastern Yorkshire, their Natural History and Origin. By Frank Elgee, F.G.S. London: A. Brown & Sons. Pp. xvi. + 361, 12s. 6d. net. As readers of *The Naturalist* are aware, Mr. Frank Elgee from time to time has dealt with the zoological, botanical, and geological aspects of the interesting area around his home; thus, to some extent, following in the wake of the late Canon Atkinson, whose 'Moorland Parish' falls within the area of Mr. Elgee's work. The recent investigations of English ecologists, Professor Kendall's magnificent memoir on the glacier lakes of Cleveland, and Dr. Scharff's 'European Animals,' have been closely studied, and they have largely influenced Mr. Elgee. At different meetings of the Yorkshire Naturalists' Union, and at meetings of the Cleveland Societies, the author has presented numerous papers, which have been discussed from different points of view. The whole of this information has been put together in the present large book, and forms a valuable contribution to the past history of Cleveland. Apart from its scientific value, the book may be of use from an economical standpoint, having reference to the minerals, the crops, and the game. The book is made more attractive by several reproductions of photographs,* chiefly by Mr. Godfrey Bingley (who has improved so many Yorkshire volumes) and the author. There are also folding coloured maps showing the geological features, distribution of the moors, etc. Altogether the book, which is well produced, is a welcome addition to the literature of the county of broad acres. It is a book to be proud of, and no doubt Mr. Elgee is proud of it.—F.G.S.

*One of them we are kindly permitted to reproduce (see Plate XII).



[Frank Elgee.]

NEWTON DALE FROM SALTERSGATE BECK.

Photo [w]

THE BORING HABITS OF THE PHOLAS.

W. HARRISON HUTTON.

REFERRING to the previous notes on this subject by Dr. Irving and myself, which have appeared in *The Naturalist*, from a discussion which subsequently took place at a meeting of northern conchologists, it was apparent that some still held the opinion that these shells bored by the aid of a secreted acid. One gentleman even exhibited a small piece of bored rock in which was a slight projection, as evidence against the theory of the rotatory method of boring. Since then I have spent some weeks at Scarborough, and while there I collected a number of *Pholas* and submitted them, and their various organs, to a number of chemical tests for acid. I also placed blue litmus paper in the holes of the molluscs, in their natural habitats, and in no case was there the slightest evidence of change, which would have been the case had there been any traces of acid present. In none of the tests, either with the shells in position, or with their dissected parts, did I find the slightest indication of the presence of acids. This seems to indicate that the animals do not secrete any acid that would assist them in any way in their work of rock-boring.

I may add that among the many who still hold the opinion that acid assists the molluscs in their work I have not found anyone who have kept any of the species in confinement and studied their habits.

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Catalogue of the Species of *Pisidium* (Recent and Fossil) in the collection of the British Museum (Natural History) with notes on those of Western Europe. By **B. B. Woodward**. London: Longmans, Green and Co., etc., 1913, pp. x. + 140 and 30 plates. In this Catalogue a departure has been made by the Museum Authorities, inasmuch as the specimens from two departments are figured and described. Seeing, however, that it is sometimes difficult to distinguish between the recent and some of the post-glacial beds, and that *Pisidia* occur in both, the authorities have been well advised in bringing their various species together in one monograph. Collectors have long neglected this group of shells on account of the great difficulty in the way of identification, due to the small size and general similarity of the various species. Mr. Woodward, after several years' study of the genus, has been able to unravel the tangle. He describes fifteen different species, gives the complete synonymy of each; the original description, and a detailed description on a modern basis. There is also a vice-county record of the occurrence of the different forms, and distribution maps showing the records of recent and fossil species. Unfortunately these refer only to such specimens as happen to be in the national collections, though it may serve as a hint to possible benefactors as to the areas from which specimens are desired. For example, no fossil *Pisidia* are recorded from Yorkshire in any of the maps, whereas, of course, the Geological Survey and other Government publications record several. There is a bibliography of nearly 200 entries, but a most valuable aid to collectors occurs in the 30 plates upon which several hundred specimens are beautifully figured. These illustrations, showing the various varieties of the different species, should make the question of identification a very simple one.

YORKSHIRE NATURALISTS AT KIRKBY STEPHEN.

‘Gay lark of hope, thy silent song resume !
Fair smiling lights the purpled hills illumine !
Soft gales and dews of life’s delicious morn,
And thou, lost fragrance of the heart, return !’

THUS sang Wordsworth, and surely his words rang true to those lovers of Nature who, with the memory of a second replica of the Deluge, sought a change for the Whitsuntide vacation at the ancient little town of Kirkby Stephen, situate at the head of the Eden valley, the pastoral charm of which was made replete by the encircling chain of hills, those northward being prominent landmarks of the Pennine range.

This is the second year in succession that the Union has ventured beyond its own border into the county of Westmorland, and although climatic conditions had retarded the growth of plant life on the fells, their sheltered valleys, and the meadowland along the vale, amply repaid investigation.

The first day was devoted to an investigation of Upper Swaledale, within the Yorkshire boundary, a portion of the county which had not hitherto been visited by the Union. From Barras the party investigated the moorland area to Tan Hill, visiting the collieries there, and then proceeded over the moors to Birkdale Tarn, returning over the Ail Brig boundary pass to Kirkby Stephen.

Nateby Common, High Seat to Nine Standards, and their intersecting valleys received a good deal of study on the second day’s outing; the geological transitions, with their varied indicative flora affording an ample field of study. The panorama as viewed from the summit of Nine Standards was exceedingly fine, the view encompassing the Mallerstang Range, Ravenstonedale, the Eden Valley, and Upper Swaledale.

On the third day the members worked the lower portion of Pod Gill, Merry Gill, the romantic dell of Stenkrith, ending with a visit to the Brockram Quarries, where they saw the most notable geological formation of Kirkby Stephen being worked.

The upper portion of Pod Gill, Hartley Fells, and the belts of intermediate woodland received attention during the time available on Tuesday.

Visits were also made to Hartley Castle and Wharton Hall. Within the grounds at the latter place are some giant examples of sycamore, mountain elm, and the huge oak known as “Lord Wharton’s Hollow Tree.” This oak is in vigorous growth, despite the fact that there is ample standing room within its hollow trunk for five persons.

The General Meeting was held on Monday, the President, Mr. Harold Wager, F.R.S., F.L.S., occupying the chair.

Reports on work accomplished were given by representatives of the various sections. Thanks were accorded to the Divisional Secretary, Mr. W. Robinson, and to Mrs. Thompson for permission to visit the Brockram Quarries.

VERTEBRATE ZOOLOGY.—Mr. A. Haigh-Lumby writes :—The chief difficulty of the Vertebrate Section was the wide area for investigation and the great distance separating the most promising portions from each other, and from the centre.

The following notes refer chiefly to the Westmorland portion of the Kirkby Stephen area. In all sixty-one species of birds were noted. It is evident the larger predatory species are holding a precarious existence, as, in addition to the nests being persistently robbed by several collectors, the birds are frequently shot by too zealous keepers. It was all the more pleasurable, therefore, to see both the Raven and the Peregrine Falcon in a feral state, the former mobbed by a Curlew and a Lapwing. Neither the Buzzard nor Merlin, nor even the Sparrow Hawk nor Kestrel were seen.

The Curlew is extremely abundant both on the hills and the low-lying rough pastures, and the unmusical call of the Corncrake was heard on all sides.

Among the lesser birds the Corn Bunting is fairly common, and in the few bits of old-timbered woodlands the Redstart and the Tree Pipit are in unusual numbers.

Equally interesting were the absentees, as the district seems eminently suitable to many birds which are common at no great distance away.

Among these were the Sedge Warbler, Moorhen, and Linnet, and one can only assume that the Magpie, now a strong suburban species, has, with the Kestrel, suffered its usual fate in a 'keepers' country.

Of the mammals the Squirrel, Fox, Hare, Rabbit, and Pipistrelle Bat only were seen. A Fox, a five-week old cub, was in the possession of a lady whose cat had suckled it.

The three-spined Stickleback was taken near Sunbigan.

CONCHOLOGY.—Mr. Thomas Castle writes :—The first day's work was devoted to noting the character and prevalence of the mollusca on the 'Brockram' series of rocks in the direction of Brough. Many species usually associated with a Limestone district were conspicuous by their absence, notably the larger *Helices*, *aspersa* not being once seen; *H. nemoralis*, *hortensis*, and *arbustorum* were met with very sparingly. The dominant shell met with was *Helix rufescens*, but the variety *nigrescens* more than doubled the type variety in numbers. *Clausilia dubia* was likewise common, although not a single specimen of *Clausilia rugosa* was met with. *Hyalinia* was sparsely represented—a coal measure area, by comparison, would yield

over 75 per cent. more of this family. Subsequent excursions made later revealed a plausible reason for their presence in the lower reaches, by finding them in numbers on the Great Scar Limestone not far distant from the area dealt with above.

Fresh-water mollusca were very scarce, partly due to the rapid movement of the mountain streams and the scarcity of dykes and ponds on the lower-lying lands. Only one or two specimens of *Limnaea peregra* and *Ancylus fluviatilis* were noted.

The wooded portions of Pod Gill yielded several species associated with Beech trees, moss, and moisture, viz., *Carychium minimum*, *Cochlicopa lubrica*, *Hyalinia pura*, and *H. crystallina*, but these could not be said to be common everywhere. Several slugs were also met with.

The Limestone scars of Hartley Fells were plentifully bestrewed with the larger Helices, *nemoralis* and *arbustorum*. *Bulimus obscurus*, *Clausilia dubia*, and *Pupa umbilicata* were equally plentiful. One looked in vain for *Hx. caperata*, and several others.

The following were obtained:—

<i>Helix nemoralis</i> .	<i>Hyalinia pura</i> .
„ <i>hortensis</i> .	<i>Clausilia dubia</i> .
„ <i>arbustorum</i> .	<i>Vitрина pellucida</i> .
„ <i>hispida</i> ,	<i>Bulimus obscurus</i> .
„ <i>rufescens</i> (type).	<i>Pupa umbilicata</i> .
„ „ var. <i>nigrescens</i> .	<i>Cochlicopa lubrica</i> .
„ <i>rupestris</i> .	<i>Carychium minimum</i> .
<i>Hyalinia nitidula</i> .	<i>Limnaea peregra</i> .
„ <i>cellaria</i> .	<i>Ancylus fluviatilis</i> .
„ <i>alliaria</i> .	<i>Sphaerium corneum</i> .
„ <i>crystallina</i> .	Several species of slugs.

FLOWERING PLANTS.—Dr. T. W. Woodhead writes:—The vegetation of the fells in the neighbourhood of Kirkby Stephen was remarkable for the extensive areas covered by sphagnum and other bog mosses. Growing among these was the Ling, with dead grey shoots tinting the whole moor, the greyness often intensified by an abundance of *Cladonia sylvatica*. *Juncus squarrosus* was also very abundant; and here and there much Cotton Grass (*Eriophorum vaginatum*), Fine-leaved Heath (*Erica cinerea*), and Crowberry (*Empetrum nigrum*). On the higher and flatter summits, where the streams have cut their way back in a series of tortuous channels, fine examples of retrogressive moor were seen. The steep peaty banks of the streams, too unstable to allow of invasion and the development of a protective plant covering, waste with every shower, and during times of drought, the surface, dried to a fine powder, is carried away by every breeze. Islands of peat are thus formed which are ever being reduced in size and are doomed eventually to disappear. At the bases of these peat-hags remains of

Birch were found in great abundance, e.g., on Stanesmoor, Tanhill, Birkdale, Nateby Common, and Nine Standards, at altitudes of upwards of two thousand feet. The steep slopes were often covered with Bracken, among which were such woodland species as the Wood Anemone. A large sphagnum bog on Nateby Common was noticeable in having the Mat-grass (*Nardus stricta*) as the chief associate. Here the boundary is sharply marked between the vegetation on the peat over siliceous rocks and the relatively bare pavement of Main Limestone adjoining, with such characteristic calcareous species as Wild Thyme, *Saxifraga Tridactylites*, *Helianthemum Chamaecistus*, also limestone mosses such as *Neckera crispa*.

At Hartley Scar a good example of Ash-birch wood was seen.

The Birch was a conspicuous associate of the Ash on the scree-covered slopes of the scars, together with Hawthorn and Hazel. The ground flora consisted chiefly of Dog's Mercury, Garlic, Arum, Primrose, Cowslip, Anemone, Herb Robert, Blue Moor Grass (*Sesleria cærulea*), Rock-rose, Thyme, and other species typical of the Limestone scar-wood.

The district is of special interest to the botanist in that examples of several important types of vegetation occur within a limited area, e.g., the calcareous vegetation of the Mountain Limestone and Main Limestone; also that developed on the siliceous rocks of the upper Pendleside series and Millstone Grits.

MOSESSES.—Mr. Fred. Haxby writes:—From an ecological standpoint, the most abundant moss in the whole district was *Hylocomium squarrosum* B. and S., both on the hedge banks and on the higher reaches, 1500 feet and more. *Hypnum Schreberi* Willd. was an important species amongst the grass on the moorlands.

In the temporary wet places on the higher parts *Hypnum fluitans* was seen covering areas of several square yards.

Aulacomnium palustre Schwæg. also helped the Sphagnum. On the wall tops, associated with *Draba verna*, were *Tortula subulata* and *Ceratodon purpurens* in abundant fruit.

The following is a list of species identified from gatherings in the Westmorland area in the immediate neighbourhood of Kirkby Stephen:—

Andreaea petrophila Ehrh.
Polytrichum strictum Banks, C. fr.
Pleurozium subulatum Rabenh.
Ditrichum flexicaule var. *densum*
 B. and S.
Swartzia montana Lindb.
Seligeria pusilla B. and S.
Fissidens decipiens De Not.

Rhacomitrium lanuginosum Brid.
R. canescens Brid.
Ptychomitrium polyphyllum Furn.
Tortula intermedia Berk.
Barbula recurvifolia Schp.
Weisia rupestris C.M.
Encalypta vulgaris Hedw.
Zygodon viridissimus R. Brown.

Ulotis crispa Brid.
Splachnum sphaericum Linn. fil.
Aulacomnium palustre. Schwæg.
Bartramia ithyphylla Brid.
Neckera crispa Hedw.
N. complanata Hübner.
Leucodon sciuroides Schwæg.
Thuidium recognitum Lindb.
Orthothecium rufescens B. and S.

Orthothecium intricatum B. and S.
Camptothecium lutescens B. and S.
Hycomium flagellare B. and S.
Eurhynchium piliferum B. and S.
Plagiothecium pulchellum B. and S.
Hypnum stramineum Dicks.
Hylocomium splendens B. and S.
H. loreum B. and S.

MYCOLOGY.—Mr. C. Crossland writes:—The mycologists had a good time, judging by the quantity of material collected and considering the time of the year. Mr. Malone, assisted by Mr. C. H. Broadhead, must have persevered in the search for fungi to enable them to collect over a hundred species. A carefully packed box containing seventy-six, mostly such as are considered micro-species, reached the writer in excellent condition. The Mycetozoa were forwarded to Mr. Cheesman. Mr. Malone's consignment was accompanied by a list of those he knew at sight. The whole consisted of 23 Agarics, 10 Polypores, 11 Uredines, 14 Pyrenomycetes, 18 Discomycetes, 10 Mycetozoa, and about twenty others. They were collected in the immediate vicinity of the excursion centre. The 109 identified are already recorded for Yorkshire. Seeing, however, that several so far rest on but solitary records, the Kirkby Stephen finds representing these may be considered of a confirmatory nature although found within the borders of Westmorland.

Should this meet the eye of any Westmorland student interested in fungi we shall be pleased, if desired, to forward the full list.

LICHENS.—Mr. W. E. L. Wattam writes:—The Lichen flora of the immediate vicinity of Kirkby Stephen, and the villages of Nateby and Hartley, with their neighbouring fells and wooded ravines, amply repaid investigation for this class of plants. The area known as Nateby Common, with its varying geological formations and characteristic plant associations, also proved an excellent working ground.

The following is a list of the species noted, all obtained within the county of Westmorland:—

Collema cheileium Ach.
Sphaeophorus coralloides Pers.
Pycnothelia papillaria Duf.
Cladonia bellidiflora Floerke.
C. cervicornis Schaer.
C. deformis Hoffm.
C. digitata Hoffm.
C. fimbriata Fr.
C. furcata Hoffm.
C. macilenta Hoffm. and var.
scabrosa Nyl.

Cladonia pyxidata Fr.
C. squamosa Hoffm.
C. sylvatica Nyl.
C. uncialis Nyl.
Evernia furfuracea Mann.
Ramalina farinacea Ach.
R. fraxinea Ach.
Usnea hirta Hoffm.
Cetraria aculeata Fr.
Parmelia caperata Ach.
P. olivacea L.

Parmelia exasperata Nyl.
P. laevigata Ach.
P. omphaloides Ach.
P. perlata Ach. and var. *ciliata* Nyl.
P. physodes Ach.
P. saxatilis L. and f. *furfuracea* Schaer.
Peltigera canina Hoffm.
P. rufescens Hoffm.
Solorina saccata L.
Physcia parietina De Not and var. *virescens* Nyl.
P. stellaris sub. sp. *tenella* Nyl.
Gyrophora torrefacta Ach.
Lecanora atra Ach.
L. calcarea Somm.
L. badia Ach.
L. callopisma Ach.
L. ferruginea Huds.
L. irrubata sub. sp. *calva* Nyl.

Lecanora murorum Ach.
L. parella Ach.
L. tartarea Ach.
Pertusaria multipunctata Turn.
P. communis D. C. and f. *rupestris* D.C.
Lecidia confluens Ach.
L. contigua Fr.
L. parasemia Fr.
L. rivulosa Ach.
L. canescens Dicks.
Rhizocarpon geographicum D. C.
Arthonia pruinosa Ach.
A. radiata var. *Swartziana* Sydow.
Opegrapha atra Pers.
O. varia Fr.
Graphis elegans Ach.
Verrucaria mauroides Schaer.
V. nigrescens Pers.

The following species were collected near Birkdale Tarn, in Upper Swaledale, by Mr. W. P. Winter:—*Cladonia digitata* Hoffm., *C. fimbriata* Fr., *C. furcata* Hoffm., *C. macilenta* Hoffm., *C. pyxidata* Fr., *C. sylvatica* Nyl., *C. uncialis* Nyl., *Parmelia saxatilis* L., and *f. furfuracea* Schaer, *Peltigera canina* Hoffm., and *Lecidia contigua* Fr.

COLEOPTERA.—Mr. M. L. Thompson, F.E.S., reports that the following Beetles were met with along the various routes by himself and one or two other members:—

Carabus violaceus, L.
Carabus nitens, L.
Nebria gyllenhali Sch.
Dyschirius globosus Hbst.
Pterostichus madidus F.
Pterostichus nigrinus F.
Pterostichus vitreus Dj.
Pterostichus diligens Stm.
Calathus melanocephalus L.
Calathus micropterus Duft.
Anchomenus albipes F.
Anchomenus fuliginosus Panz.
Bembidium atrocaeruleum Steph.
Trechus minutus F.
Tachinus marginellus F.

Olophrum piceum Gyll.
Necrophorus mortuorum F.
Trichopteryx atomaria, De G.
Meligethes aeneus F.
Micrambevinus Panz.
Cytilus varius F.
Elmis volkmari Panz.
Elmis parallelepipedus Mulls.
Cryptohypnus riparius F.
Chrysomelus politus L.
Chrysomelus staphylea L.
Apion ulicis Först.
Polydrusus micans F.
Sitones suturalis Steph.
Liosoma ovatum Clair.

GEOLOGY.—Mr. J. J. Burton writes:—On Saturday morning the members walked over the pass from Barras to Tan Hill, where the highest Millstone Grit house in England is situated, examining by the way the very fine examples of deep cuttings made by fell-side streams into the soft shales and grits. In some of these streams many *Stigmara* were noticed.

Tan Hill Colliery was also visited, where, in the Millstone Grit series, a seam of coal five feet in thickness and of moderate quality has been extensively worked, and we were informed

the workings extended a mile and a quarter. In days gone by, before the Eden Valley line was opened, a flourishing trade was done, as this colliery practically supplied all Edenside north of Appleby, as well as all Swaledale and not a little of Upper Teesdale. A gentleman who left the place forty-seven years ago, and was paying his first return visit at the time we were there, said he well remembered as a boy that thirty or forty carts would often arrive during the night in order to catch an early turn on the following morning to load coal away for the Eden valley.

At present there are only five men employed, and the workings seem to be solely for the purpose of supplying those very inaccessible places in Upper Swaledale which are now shut off from all reasonable access to a railway. The coal is won by a drift into the hillside. Much water was issuing from the drift, but we were told it was from the feeders tapped in the course of driving into the coal and not from the coal seam itself.

From this point a bee-line was taken to Birkdale Tarn, but the boggy nature of the ground, the deep water-worn valleys and the gulfs of wasting peat made the track very far from that of a bee-line. The numerous deviations, however, enabled us to observe many physical features of great interest.

At Raydon's Seat, over which there is a confluence of several fell streams, the extremely soft shales of the Upper Yoredales have been deeply cut back, and the cutting is rapidly going on. Near by was a *Stigmaria* a yard or more in length.

Along the route several exposures of Ganister were noted, but the quality was somewhat uncertain. Whether the stains were from peat percolations or were those of iron could not be determined on the spot.

Near Birkdale Tarn were some very colossal contorted blocks of grit, with the laminæ practically U-shaped. The tarn itself is a considerable sheet of water standing high up on the hillside, on what may, for want of a better term, be called a terrace, and extends right to the edge of the declivity, at the bottom of which is Birkdale. It seems to rest on a peaty foundation, and receives a considerable influx of water, far more, in fact, than appeared to leave it at the outflow.

The remainder of the excursion was spent partly on the Yorkshire side and partly on the Westmorland side of the border.

Nateby Common was crossed, and one of the innumerable faults was inspected. The fault shows a gap from a few inches to two or three yards in width. Dislocation appears to have been considerable and with great force. The Underset and its shales, as well as the Main Limestone on one side, have been violently crushed, and the cleavage altered to a vertical plane. On the opposite side the rock seems to be the Main Limestone, and gives considerable evidence of anticlinaling.

The bedding plane is horizontal, but the usual vertical fractures have taken an irregular oblique direction at an angle of forty to forty-five degrees from the horizontal. Crossing Kitching Gill the whole series between the bottom of the Underset and the Main Limestone can be very fully and easily examined.

On the top of the common the Main Limestone has weathered into pavement form, but here, unlike similar weathering in the Ingleborough district, the joints are filled up with soil, the debris of some vanishing deposit, and sustains a scanty vegetation.

Those who went to the top of the Nine Standards were well repaid, but for examination of solid geology the many exposures in Rigg Beck were satisfactory. This stream rises in the Nine Standards, and affords a beautiful example of how a fault is widening. Following the stream down it was curious to come across a self-sown forest of stunted and decaying larches, and to notice how on one side of the stream the heather mounted half way up the slopes, while on the other scarcely a plant could be found. Among the grits also was evidence of a Permian deposit in the soil which the rabbits had thrown up in their burrows, but perhaps one of the most interesting observations was an outcrop of Brockram along with the Great Scar Limestone. At this point there had evidently been a very big up-thrust, and at the junction between the two the crushing has been great, and well-formed quartz crystals as well as some of Fluor Spar, were common. The rocks were tilted at a very high angle, almost vertical, and the whole series of Great Scar Limestone crags was so arranged that they looked like a big serrated hog's back against the skyline.

Monday was chiefly devoted to an examination of the curious and beautiful cauldron and pot-hole structure in the Brockram in the neighbourhood of Stenkreth, finishing up by a visit to one of the quarries where this extraordinary material is being won for building purposes.

The Brockram about Kirkby Stephen is much coarser in structure than that further north. It may be said to consist of angular pieces of limestone, many with corals intact, forming into a solid mass by a matrix apparently largely composed of Permian sands. Many of the pieces have faces several inches in length, and gives one the impression of a breccia having been artificially formed into a beautiful concrete in the quarry. It was noticed that the rock took much the form of a limestone rock in the way of joints, and although the evidence of stratification was almost absent, the material fairly readily split along definite horizontal lines, and in doing so paid no regard to the faces of the included fragments of limestone but sheared them right across. Our President and some others took an active part in these quarrying operations !

W.E.L.W.

In Memoriam.

LORD AVEBURY, D.C.L., F.R.S. ETC.

(1834—1913).

WE much regret to learn, as we go to press, of the death of Lord Avebury, at the age of 79. He was better known by his former title of Sir John Lubbock, and was the head of a successful banking business. With the late Sir John Evans, Huxley, Lyell, and a number of the earlier workers, he took a keen interest in the evidences of primitive man, and contributed a valuable volume on the subject under the title of 'Pre-historic Times,' the first edition of which was issued nearly half a century ago.

The extent of Lord Avebury's activities was remarkable. He had been Chairman of the London County Council, President of the London Chamber of Commerce, member of Royal Commissions on the advancement of Science, on Public Schools, on International Coinage, on Gold and Silver, and on Education; President of the British Association, President of the Entomological Society, the Ethnological Society, the Linnean Society, the Anthropological Institution, and the Ray Society; and Vice-President of the Royal Society. He was for some years Vice-Chancellor of the University of London and Principal of the London Working Men's College. He was a popular lecturer and a voluminous writer, among his books being 'The Use of Life,' 'The Beauties of Nature,' 'The Pleasures of Life,' 'The Origin and Metamorphoses of Insects,' 'Ants, Bees, and Wasps,' 'On the Senses, Instincts, and Intelligence of Animals,' 'The Origin of Civilisation and the Primitive Condition of Man,' 'British Wild Flowers, considered in relation to Insects,' 'The Scenery of Switzerland,' and 'The Scenery of England.' Nor in this connection must we forget his 'Hundred Best Books.'

To a large section of the community he will be remembered by his work in connection with the setting aside of the Bank Holidays.

With Lord Avebury we lose one of the few remaining links between the present and past generation of scientists.

T.S.

FUNGI.

***Morchella semilibera* in the Don district.**—A fine specimen of Lanky Morel was found by my daughter Sarah recently in a lane between Newhill and Abdy. It overtopped the long grass in which it grew. We find some species of this genus on the Permian limestone, but this is the first I have seen from over our coal measures.—J. H. PAYNE, Newhill, West Melton, Rotherham.

ECOLOGICAL METHODS OF SOIL ANALYSIS.

Referring to Mr. J. W. H. Johnson's notes in *The Naturalist* for April (pp. 169-171), I must point out that my paper on 'The Water Content of Acidic Peats' is only an abstract and obviously a very condensed abstract, for it not only summarises in a couple of pages over 70 analyses, but introduces a new method of assessing the humidity of a soil.

When Mr. Johnson complains that my figures expressing the water-content of peats are 'incomprehensible' and the 'character of the whole paper enigmatical,' I may hope to enlighten him. But I cannot unravel the tangle in the main paragraph on page 170. Simply I deny the truth of every conclusion at which he arrives. I propose to confine myself mainly to two objections, viz. :—

- (1) 'the unusual methods of stating the results obtained,' and
- (2) 'the erroneous results obtained by confounding ratios with percentage composition.'

In reality they resolve themselves into one charge, viz., that I express my analyses (including the water-content of the wet peat) in terms of the air-dry peat. As far back as 1865 Sachs found that 'a young plant began to wither when the soil still contained water equivalent to 12.3 per cent of its dry weight.'¹ In his standard work on *The Soil*, A. D. Hall² gives a table of the water capacity of soils expressed in three ways. The first method states the water absorbed by 100 of dry soil and gives, in the case of peat, such 'incomprehensible figures' as 155 parts of water per 100 of dry soil. Is there anything but a verbal difference between 'per 100 of dry soil' and 'per cent of dry soil'? So again, Briggs and Shantz³ of the U. S. Department of Agriculture, define the wilting co-efficient as the moisture content of the soil expressed as a percentage of the dry weight when the plant wilts, and they give 1,300 analyses on that basis.

It is true I base my own analyses on the air-dry weight, but that is only a refinement that eliminates a small proportion of water of no service to the plants. It in no wise affects the principle involved, and agricultural analyses of soils are regularly expressed in terms of the air-dry weight. I am quite aware of the difficulty encountered in the case of peats by those unfamiliar with the process, and have anticipated it in a paper just published in the *New Phytologist*.⁴ I there state that 'partly to conform to agricultural practice and partly because the wet soil represents no fixed standard,' the results are expressed 'in terms of 100 parts of air-dry soil, i.e. of soil dried at 15°C. The water-content, otherwise the loss at 15°C., then becomes an addition to the 100 parts. But in the case of peats the statement of the water-content is paradoxical unless the exact expression receives careful attention, e.g., 'the water lost at 15°C. is 135 per cent. of the air-dry peat' means that there are 135 parts of water lost on every 100 parts of the air-dry peat that remains after drying.'

According to Mr. Johnson, such values as 135 per cent of the air-dry peat 'on closer examination appear to be ratios and have nothing whatever to do with percentage composition-amounts,' and 'by confounding ratios with percentage composition,' I have arrived at 'erroneous results.' I venture to affirm that my abstract published in *The Naturalist* contains no erroneous results, though Mr. Johnson arrives at several, as when he discovers that a peat which I state to contain 80 per cent. of humus, 'has a humus content of $\frac{80}{2}$ or 40.' Nor is there any confusion of percentage amounts and ratios, for all percentages are ratios. The very number (575) that Mr. Johnson deduces for the ratio $\frac{\text{water content}}{100 \text{ pts. dry peat}}$

¹ Warming, *Oecology of Plants*, p. 49.

² Edition 2, p. 66.

³ *The Wilting Co-efficient for Different Plants*, 1912.

⁴ The Co-efficient of Humidity: a new method of expressing the Soil Moisture.

is obtained by the identical arithmetical process that yields 96.96 parts of Organic and Volatile matter per cent. of moisture-free peat and all the other percentage values in the second and fourth columns of his table of the analysis of peat. As they have all been deduced by the same process from the amounts in terms of the wet peat, their relative values remain unchanged. But there is a great gain in adopting the dry-peat values.

'To correct any false impressions about the composition of peat,' Mr. Johnson states:—'Peat usually contains 80-90 per cent. of moisture and when air-dried, 15-25 per cent.' Whilst literally true the statement is misleading, for the standard of comparison is changed midway and the numbers are not comparable. Who will realise that the second quality (say 15 per cent.) is little more than a *thirtieth* of the first (80 per cent.)? But so it is. If a wet peat loses 80 per cent. of water on air-drying, there will be a further loss of 3 per cent. when it is oven-dried; and these numbers become 400 per cent. and 15 per cent in terms of the air-dry peat. Either one scale or the other must be adhered to throughout. I will try to illustrate briefly the principle underlying ecological methods of soil analysis.

Of course, there are other factors to be considered, but what I am concerned with is to find an accurate quantitative expression for the relative wetness or humidity of a plant habitat. To take a specific case. Heather growing on the moors usually has its roots partly in a layer of moderately pure peat and partly in a nearly pure coarse sand, and these layers differ enormously in their water-holding capacity, and therefore in their water-content, at all times of the year. I had on that account to reject the water content as an unsuitable index of the soil humidity and to look for a more reliable expression that would be generally applicable to natural soils. Numerous analyses have shown that, excluding clay soils, the water retained in the soil is held almost entirely by the humus; so much so that as soon as the humus in any soil is reduced to unity the corresponding value of the water becomes a true measure of index of the wetness of the soil. This ratio I have called the co-efficient of soil humidity and subject to a correction in certain cases the co-efficient of soil humidity equals $\frac{\text{water-content}}{\text{humus-content}}$ where the water-content is the water lost when the soil is allowed to dry in an ordinary room at about 15°C.

In the abstract published in *The Naturalist* in 1911 this was called the water co-efficient and its values were shown to be distinctive of various types of moorland. A couple of analyses will show how it is of service in another field. Both samples were taken in the same wood on the same day for the purpose of distinguishing the habitats of (1) hair-grass (*Deschampsia flexuosa*) growing over grit boulders and (2) the great brome or fescue (*Bromus giganteus*) typical of much damper places and actually growing on a little alluvial flat by a stream side. In the latter case the sample was in two portions, one from the ball of roots, the other just below. To remove difficulties that have arisen I will set out the analysis in full.

Soil No.	(A) In terms of Wet Soil.		
	172 <i>Desc. flexuosa.</i> per cent.	173 i <i>Bromus giganteus.</i> per cent.	173 ii per cent.
WATER—			
(a) Loss at 15°C	19.91	55.55	22.55
(b) Further loss at 100°C.	4.74	2.82	1.63
Humus=Loss on combustion	20.25	11.28	4.13
Mineral Residue	55.10	30.35	71.68
	100.00	100.00	99.99

The co-efficient may be deduced if we wish, from the figures in the first and third lines; but apart from that the soils all look different and the middle one decidedly wetter than both the others; also the loss at 100°C in the first case seems disproportionately large and suggests incomplete drying at 15°C.

(B) In terms of the Air-dry Soil.

Soil No.	172 per cent.	173 i per cent.	173 ii per cent.
Water-Content ..	24.8	125.00	29.1
Loss as 100°C.	5.92	6.34	2.10
Humus ..	25.28	25.37	5.33
Residue ..	68.80	68.28	92.55
	<hr/> 100.00	<hr/> 99.99	<hr/> 99.98

We are now on much surer ground for we are looking at the soils apart from the water they hold—the quantity of which may vary from day to day. The first two are as alike as it is possible for two soils to be and both rich in humus, whereas the third is deficient in it; further, the apparent excessive loss of water at 100°C. has vanished. So the analysis stated in terms of the wet soil was both deceptive and failed to bring out the true character of the soils.

But we have not yet arrived at a true estimate of the wetness of the soils, for the middle one looks much wetter than the others. Applying the figures in either table to find the ratio $\frac{\text{water content}}{\text{humus content}}$ we get:—

	172	173 i	173 ii
co-efficient of humidity	0.98	4.9	5.4

We conclude that the habitat of the hairgrass (No. 172) is a very dry one, so much so that only a drought resisting plant could survive the conditions. But even more interesting is the way in which the lower section of No. 173 responds to the test and reveals itself as a thoroughly wet soil quite in line with the upper portion, and in strong contrast to No. 172, though there is no disparity in their water-content. The correction already mentioned would reduce the value of 5.4 somewhat and bring it even nearer to 4.9. But for a discussion of this I must refer those who are interested to my paper on the co-efficient of Humidity. It is evident that this co-efficient furnishes a new standard for judging the state of humidity of a soil and as such it is likely to be of value in Ecology.

There remains only one little point that requires elucidation. A single line in the 'Abstract' is given to the ratio $\frac{\text{Humus}}{\text{Mineral}}$ as a convenient way of expressing the humus-content of the peat. It is not a matter of any importance, but I have found it convenient in dealing with long series of soil analyses to have one number in sight by which to classify them. Thus in the soils already quoted the $\frac{\text{Humus}}{\text{Mineral}}$ ratios are 0.37, 0.37, and 0.06 respectively, and these numbers are the proportions of humus to one part of mineral residue in each. If the number is greater than 1.0 the soil may be classed as a fairly pure peat or its equivalent; if on the other hand it is less than 0.1 the soil is decidedly deficient in humus; if less than 0.01, it is of the nature of dune sand.

W. B. CRUMP.

HALIFAX,

May 18th, 1913.

REVIEWS AND BOOK NOTICES.

One and All Gardening, 1913. London: Agricultural and Horticultural Association. 128 pp., price twopence. In the eighteenth issue of this Annual Mr. Greening has an illustrated article on the movements for developing garden cities. Mr. J. H. Crabtree writes on the People's Gardens, their betterment and educational value. Indoor Bulb Culture is explained and advocated by Mr. S. Leonard Bastin. Mr. Leslie Greening contributes a practical article on the Culture of Clay Gardens. Secrets of Garden Lichens is well illustrated by Mr. James Scott. Mr. G. H. Hollingsworth writes on School Gardening, the Hon. H. A. Stanhope contributes some further notes on the Rose, and Mr. Herbert Mace has an article on Bee-keeping past and present.

Messmates. By E. Step. London: Hutchinson and Co., pp. xii. + 220. 6s. net. In this 'Book of Strange Companionships,' Mr. Step has brought together a large number of the more remarkable instances of animal and plant associations for mutual benefit. He instances lichens, bacteria nodules on clover roots, the Buffalo and Buffalo birds, Fierasfer and Sea-cucumber, Pearl Oyster and Pontonia, Dor Beetle and Mites, the Ant's nest Woodlouse, and several other instances where, in the opinion of the author, the associated species are living with each other for their joint benefit. With mere human eyes this may appear so, but could we hear the verdict of the organisations themselves, particularly the hosts, it might be quite another story. The book is written in Mr. Step's well-known style and will doubtless appeal to a wide public.

Wild Flowers as They Grow. By H. E. Corke and C. G. Nuttall. Cassell and Co., 1913. 5s. net. This is the fifth book of the series illustrating wild flowers, 'photographed in colour direct from nature' by Mr. Corke. The results on the whole are very satisfactory, and give faithful representations of the plants. Twenty-five species are illustrated and described, including the butterbur, corn cockle, dwarf thistle, toad-flax, lungwort, privet, snowflake, twayblade, ling, and yellow-rattle. The text, by Mr. Nuttall, is clearly and simply written, and illustrated by somewhat crude but clear diagrams of the flower parts. In addition to a brief life-history, numerous common names are given, some old and curious, together with ancient plant lore, which will prove interesting to the reader. Sometimes botanical terms are used in a too 'popular' sense, e.g., the 'seed' of the butterbur is said to carry 'the calyx-crown or pappus,' fertilization is used for pollination, and the term 'bulb' is applied indifferently to all thickened underground structures.

A Hand-List of the Lichens of Great Britain, Ireland, and the Channel Islands. Compiled by A. R. Horwood. 42 pp., One Shilling net. Dulau & Co., Ltd., London. Presumably this Hand-List has been issued for the purpose of handy reference for the worker in field or laboratory. The nomenclature and order are said to practically follow the two parts of the Monograph of British Lichens published by the Trustees of the British Museum. The author, however, admits a re-arrangement of the genera, and especially of the species of Lecanora. The re-arrangement adopted is confusing, and detracts from the value of the List, and it certainly will not meet with universal approval by the Lichen student. It may be that Part I. of the Monograph of British Lichens is somewhat out of date, yet both this Part and Part II. of the same excellent work are known and used by British lichenologists. Among the omissions from the Hand-List we notice *Parmelia conspersa* Ach., f. *isidiata*, which is included in Miss A. Lorrain Smith's 'Lichenes of the Clare Island Survey' (Proceedings of Royal Irish Academy, Vol. XXXI., Part 14).

NEWS FROM THE MAGAZINES.

An alleged portrait of Gilbert White appears in *The Selborne Magazine*, for April.

The Lancashire Naturalist (No. 60) contains a paper on Lancashire Arthropods by Mr. A. R. Jackson.

In *Knowledge* for April, Mr. C. D. Soar, F.L.S., whose work is well-known to our readers, has a paper on the Trombidoidea.

Prof. C. J. Patten writes on 'The Diurnal Migrations of certain Birds observed at the Tuscar Rock,' in *The Zoologist*, for May.

A scathing criticism of the new Hand List of British Birds appears in *The Ibis*, for January, from the pen of Dr. P. L. Sclater, F.R.S.

Dr. Winifred E. Brechley has a paper on 'Yellow Rattle as a Weed on Arable Land,' in the *Journal of the Board of Agriculture* for March.

In *The Entomologist* for May Mr. F. W. Frohawk gives 'The Life-history of *Cænonympha tiphon*,' based on specimens from the Whitby moors, Kendal, etc.

In *The New Phytologist*, for February, Mr. M. C. Rayner writes on 'The Ecology of *Calluna vulgaris*' (the Ling), based on observations in the South of England.

In the *Zoologist* for March is a record of a Marten in Lincolnshire, killed so recently as 1905. The same journal contains a Key to British Henleas, by the Rev. H. Friend.

In *The Entomologist's Monthly Magazine* for May, Dr. L. Lindinger describes *Aspidiotus bavaricus* Ldgr., a scale-insect new to the British list. It is recorded from Chester and Aberdeen.

The Ninetieth Report of the Whitby Literary and Philosophical Society contains an obituary notice of the late Thomas Newbitt, F.G.S., 'General Contrasts between the summers of 1911 and 1912,' and 'The Thunder-storm of July 12th, 1912,' the last being by Mr. J. W. Barry.

Professor A. C. Seward, F.R.S., describes a British Fossil Selaginella (*Selaginellites Dawsoni*, sp. nov., from the Fairlight Clay of Ecclesbourne, Sussex), in *The New Phytologist* for March, and in the same publication Dr. F. Cavers writes on Recent Work on Flagellata and Primitive Algae.

Two curious words, withywind and withershins, are explained by Mr. Harwood Brierley in *Knowledge* for May. Climbing plants which twist like the convolvulus in the direction of the hands of a watch, or in the direction of the sun, are withywind, while the French bean, which chooses the opposite direction, is a true withershin.

The final part, No. 25, of *The Mineral Kingdom*, by Dr. R. Brauns, has made its appearance, and this excellent work, translated by Mr. L. J. Spencer, of the British Museum, should be in the hands of every mineralogist. There are seventy-three coloured plates, which are as near perfect as is possible, and there are nearly three hundred text figures. The English publishers are Messrs. Williams and Norgate.

In view of our remarks in a previous number, we are glad to notice that the 'Census Authentications,' published in *The Journal of Conchology*, are 'based upon examples sent to the official authenticators.' At the same time we think that these 'official authenticators,' by whoever appointed, should be prepared to accept records made by as able workers as themselves.

Messrs. L. E. Hope and D. L. Thorpe contribute their 'Natural History Bureau Records, 1912,' to *The Zoologist* for April. And in the same publication Mr. C. Ingham gives a 'Description of a new form of Long-tailed Tit.' The description occupies half-a-page, and there is no illustration. The 'new form' is based upon two dark coloured Portuguese specimens in the British Museum, and the name given is *Agithalus caudatus taiti*, sub. sp. n.

NORTHERN NEWS.

Messrs. Witherby and Co., have been appointed European agents for *The Emu*.

Kingmore Common has been presented to the Carlisle Museum Committee by the Corporation, to be kept as a 'Nature Reserve.'

We notice an advertisement offering 'The King of all Ornithopteras, directly from the sources!! Fresh ex-larva, set or in paper bags.'

A Yorkshire Museum is offering for sale 'Bird Pictures in water-colours from 1s. to £110.' We have not seen them, but they ought to be good at that price.

At the recent International Congress of Zoology at Monaco, Dr. F. A. Bather, of the British Museum, was elected President of the section dealing with Nomenclature.

'Sir Ralph Payne-Gallwey's book, 'High Pheasants in Theory and Practice,' is announced for publication. For eating purposes we prefer them in theory.'—*Punch*.

The Burton-on-Trent Natural History Society has presented its collections to the town, and the Corporation has given the upper part of the old Police Station for a museum.

Two 'golden eagles' are reported at Filey, and are alleged to have carried lambs away. If eagles at all, the birds were probably white-tailed eagles, and the lambs were doubtless rabbits!

'Dear Brothers and Sisters, Merry Christmas to you all. How have you spent Christmas Day? I have begun very well,' etc., is the type of letter quoted in 'Links with the Past,' in a recent provincial natural history journal.

We learn from *The Standard* of April 23rd that 'Squamaria, an exceedingly rare plant, has been discovered at Marholm, near Peterborough. Most of its life is spent grubbing about in the ground, and it never shows itself above the surface except for a week or two in the spring.'

Hull Museum Publications, No. 92, being the 43rd Quarterly Record of additions, contains a number of articles on Old Hull Shipping, illustrated by reproductions of photographs of oil paintings, etc., recently purchased. There are illustrations of model trawlers and nets, a 'dug-out' boat found in excavations at Hull, and notes on marine life, etc. It is sold by Messrs. A. Brown and Sons at one penny.

The Palæontographical Society's Volume, for 1912, contains part IX. of the Monograph of British Graptolites, by Gertrude L. Elles and Ethel M. R. Wood; Part IV. of the Monograph on Cambrian Trilobites by P. Lake, and the concluding portion (Vol. 2., part 9) of the Cretaceous *Lamellibranchia* of Britain, by H. Woods. The Palæontographical Society seems to be following the example of the Geological Society in the way in which its publications appear late.

Phillippa C. Endaile contributes a valuable paper on 'The Scientific Results of the Salmon Scale Research at Manchester University,' to the *Memoirs and Proceedings of the Manchester Literary and Philosophical Society*, Vol. 57, part 1. In the same publication, Mr. D. M. C. Watson writes on 'The Larger Coal-Measure Amphibia.' Strangely enough, no locality is given for these interesting specimens, but we understand they are from Newsham Colliery, Northumberland.

From the report of the Borough Librarian and Secretary to the Museum Committee, we learn that judging by the small demand for Natural History (*sic*) compared with other years the interest in Nature Study among Beverley children has considerably decreased. This is probably accounted for by another paragraph in the same report. 'The Museum year (*sic*) has been one of retrenchment . . . several loans and gifts have been reported . . . but these have scarcely been so valuable or numerous as in other years and practically no purchases have been made.'

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A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND

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T. SHEPPARD, F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;

AND
T. W. WOODHEAD, Ph.D., F.L.S.,
TECHNICAL COLLEGE, HUDDERSFIELD.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S.
Prof. P. F. KENDALL, M.Sc., F.G.S., JOHN W. TAYLOR,
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RILEY FORTUNE, F.Z.S.

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NOTES AND COMMENTS.

ABNORMAL WILD HYACINTHS.

The Journal of the Northants Natural History Society and Field Club (No. 130) contains a record of a remarkable growth of the wild hyacinth. The specimens were gathered in a wood near Oxford. The stems of one or two specimens 'measured 2 feet 3 inches in height, of which about six inches may have been below the surface of the ground. Two of these stems were exceptionally stout, the lowest flowers (four in one case) on extremely long pedicels, the lowest pedicel being eight inches long in one case and five in the others. In each case the bracts about the base of the raceme were excessively long and leaflike, measuring six inches in length and three-seventeenths of an inch in breadth, purplish only at the base and the rest green; these lower leaflike bracts merged gradually into the ordinary purple bracts upwards on the stems. The flowers were large and numerous—in one case forty-four on a stem.'

EVOLUTION OF THE BRONZE SPEAR.

An unusually instructive paper on 'The Evolution of the Bronze Spear and Sword in Britain,' by Mr. Parker Brewis, appears in the Proceedings of the University of Durham Philosophical Society, Part 1 of Vol. V.* By the aid of numerous illustrations of Bronze Age weapons found in various parts of Britain, he demonstrates how the relative age of a bronze spear may be ascertained, and at the same time shows very clearly the various advances made in the manufacture of the weapon, from the earliest examples which resembled the previous weapons of flint, to the most advanced types. A similar series illustrates the growth and evolution of the sword.

THE CARBONIFEROUS LIMESTONE.

An admirable example of the advantages to be derived from systematic investigations, backed up by a wealthy Society, is illustrated in the voluminous 'Report of the Committee appointed to report upon the Carboniferous Limestone Formation of the North of England, with specific reference to its Coal Resources.' It contains 240 pages, is illustrated by maps and diagrams, and is largely the work of Mr. Stanley Smith. The Report is published by The North of England Institute of Mining and Mechanical Engineers, under the auspices of which the work was carried out. The Report is in seven sections, and deals with the following types of rock:—Northumberland, Liddesdale, Alston, North Yorkshire, Cum-

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brian, Bolland, and Furness. Each is dealt with in great detail, with particulars of the various measured sections, etc. The maps showing the positions of the various collieries illustrate in a very graphic—almost startling—way how important the subject must be to Northumbrians.

THE BRITISH ASSOCIATION REPORT.

The 'impossible' has been achieved. The Report of the Dundee Meeting of the British Association, bound and indexed, was distributed towards the end of May. Seeing that, with the exception of the Index and the cover, it was all in type, and paged, at the Dundee Meeting, the achievement may not, to most people, seem miraculous. But in previous years we have been assured by the Secretary that, on account of the holidays of the staff (!), etc., it has not been possible to get the volume out earlier than the eve of the following meeting. Anyway, Mr. O. J. R. Howarth is to be congratulated upon having indexed, bound, and distributed the present volume within nine months of the meeting. Possibly in the years to come it may be possible to get the Report indexed within a month or two of the meeting. If the staff had holidays after the Report were issued things might be different!

THE CONCEALED COALFIELD OF YORKSHIRE AND NOTTINGHAMSHIRE.*

This Memoir is an outcome of explorations for coal, made for the most part since the publication of the Report of the Royal Commission on Coal Supplies in 1905. Much information has been obtained confirming or modifying the opinions held at the date of that Report. After a general introduction in Chapter I., Chapters II. and III. give an account of the Coal-bearing Carboniferous rocks and of their barren cover. In the subsequent chapters the limits of the concealed coalfield are discussed, and the results obtained by shaft-sinkings and borings analysed. The records of numerous shaft-sections and borings form an appendix. The Memoir is illustrated by five text illustrations and three folding plates, of which one is a map giving the position of the shafts and borings and also showing by contours the depth to the coal-bearing strata.

SHRIMPS AND POLITICS.

Referring to Mr. Nelson's note on the abundance of the small crustacean, *Euthemisto compressa*, on the Yorkshire coast a little while ago, *The North Star* has the following note under the head of 'Northern Lights,' and oddly enough it is headed 'A "Fishy" Story':—'Whenever our Radical contemporary attempts to deal with anything which has any

* Mem. Geol. Survey. 1913. Pp. vi. + 122. 1s. 6d.

connection whatever with nautical [!] matters, it generally becomes unconsciously funny. An instance of this was seen in yesterday's issue. Under the heading, "Stranded Shrimps," an account was given of the supposed landing on the beach at Redcar, within the high-water mark, of "fifteen to sixteen loads" of shrimps. Apparently, our contemporary has never heard of the prevalence of "sea-lice" in the ocean. It is not a delectable subject, but the idea of sea-lice being mistaken for shrimps has immensely tickled the "old salts" on the East Cleveland coast. It is to be hoped that no one will now regard these unwelcome arrivals as shrimps, as the consequences might be far from pleasant.' We do not at all wish to side with what is apparently a political matter, but 'our Radical contemporary' is certainly much nearer the mark in calling these organisms 'shrimps' than is the constant *North Star*, which calls them lice, no matter what the 'old salts' say.

GIFT OF BUTTERFLIES TO LEEDS UNIVERSITY.

The University of Leeds has recently received a valuable addition to its scientific collections in the presentation by Mrs. A. H. Clarke of the collection of Continental and Exotic Macro-lepidoptera made by her late husband, who was one of the senior Fellows of the Entomological Society, and, up to a few years of his death in 1911, a frequent contributor to entomological journals. This part of the collection, containing exotic butterflies, consists of nearly six thousand specimens from all parts of the world, and is particularly valuable as a reference collection, not merely from the number and careful selection of the forms represented but from the perfect condition and beauty of the specimens themselves. The donation enriches the entomological resources of the University by over twelve thousand specimens all carefully set, arranged, and labelled, and to this Mrs. Clarke has added her husband's working library of entomological literature, itself a present of great value and utility. The University authorities wish it to be known, in conformity with Mrs. Clarke's desires, that after the work of arranging and cataloguing has been concluded, the collections will be available for reference by entomologists generally upon application to the Professor of Zoology at the University.

'The Destruction and Dispersal of Weed Seeds by Birds,' is the title of a paper by Mr. W. E. Collinge, in *The Journal of the Board of Agriculture* for April.

Dr. D. Woolacott gives a useful summary of present knowledge of the Geology of North-East Durham and South-East Northumberland in the *Proceedings of the Geologists' Association*, Vol. XXIV., Part 2; and in the same publication he reports on the Association's Excursion to Sunderland and Tynemouth in May, 1912.

LUCERNARIA AT SCARBOROUGH.

JOHN IRVING, M.D.,
Scarborough.

Lucernaria campanulata has made its appearance in South Bay, Scarborough. As far as I know it has not hitherto been found in this locality. I saw it for the first time on 7th May, at low tide, in an open tidal pool bottomed with flat rocks variegated by red, green, and brown weeds. In the intersecting rock channels, where the depth of water varied from twelve to eighteen inches, the oak-tree seaweed, *Halidrys siliquosa*, with its long floating fronds, was plentiful. Individual lucernarians—about thirty altogether—were sparsely distributed over a fairly wide area, securely attached by their

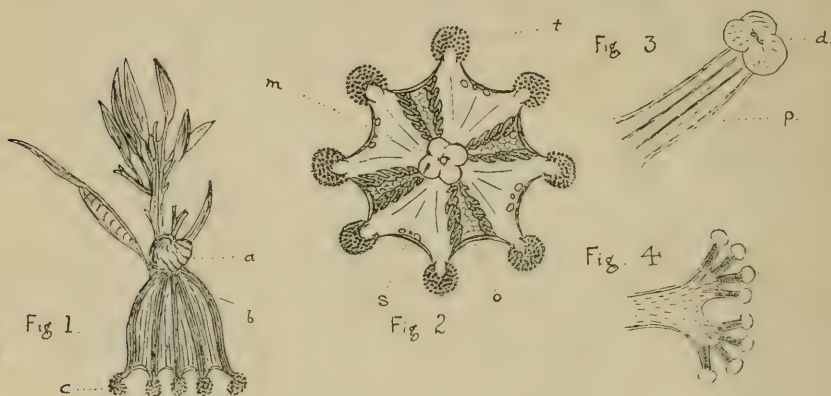
*Lucernaria campanulata.*

Fig. 1.—*Lucernaria*, $\frac{1}{2}$ -nat. size, attached by (a) contracted aboral disc to *Halidrys siliquosa*; (b) bell-shaped body; (c) claw-shaped tentacular tufts surrounding oral entrance.

Fig. 2.—Diagram of internal arrangement; (t) tentacular tufts; (m) mouth; (s) sperm-masses; (o) genital bands showing white egg masses in central position.

Fig. 3.—Extended pedicle (p) with anemone-like disc (d).

Fig. 4.—Cluster of capitate tentacles from young specimen as seen under microscope ($1\frac{1}{2}$ -in. objective).

aboral discs to *Halidrys* branches, and only discernible by careful scrutiny owing to the perfect harmony of their environment, and the fact that a large patch of seaweed rarely yielded more than one specimen. Not one was discovered unattached, or adherent to rock, or any other species of seaweed. In colour they resembled ordinary beadlet anemones. Dark-brown forms were most common, but reddish-brown, red, and deep green were in evidence. One very young specimen, about a quarter of an inch long, white and semi-translucent, except for numerous light-brown lines and spots scattered over bell and stalk, was valuable for microscopic study. Living, as it did, for more than a fortnight in a glass cell, containing

fresh sea-water only, without any kind of weed or any apparent source of colouring matter, the pigmentation lines and spots were observed to darken in tint, grow in size, and invade all the tentacles. Detached from its natural anchorage, the little creature was for several days very restless, but there was no attempt to change its place by pulsation or otherwise. The somewhat flattened bell, lying on the bottom of the glass, if uninterfered with, displayed movements of body, of stalk, and of tentacles. The stalk was often considerably elongated and smooth in outline. It appeared to be in search of a suitable lodging place, curling itself first to one side, then to the other, now downwards, then upwards, revealing its anemone-like base or disc and aperture. When the stalk was touched with a pencil it immediately contracted to a third, or even a quarter of its length, withdrawing its disc and wrinkling itself into transverse folds and undulating margins, clearly indicating a sensitive and highly muscular organization. The bell-shaped body exhibited definite muscular movements consisting of expansion or contraction of one or more segments, the power to depress, to raise, or to turn the bell bodily over on to its tentacles. Capitae tentacles, few in number in this young specimen compared with an adult, were in groups of four, marking the summit of each of the eight cleft digitate processes which arise from the margin of the bell (Fig. 4). Each tentacle, however, had an absolutely independent range of movement apart from its fellows, or it could unite with those of the entire tuft in concerted action. At the end of a week, failing in its quest for a stem of *Halidrys*, the young lucernarian actually attached its disc to the glass and there remained firmly adherent till it died.

Lucernarians are classed amongst Jelly-fishes as *Stauro-medusæ*, and while there are distinct points of resemblance to *Medusæ*, the general endowment of the race seems more in consonance with actinzoa. The pulsatile swimming so characteristic of *Medusæ* is non-evident, nor does the life-history reveal metamorphosis. On the other hand they possess a peculiarly sensitive aboral disc which in the case of *Lucernaria campanulata* always finds out *Halidrys siliquosa*, and apparently no other seaweed, for mooring purposes. Once attached to this, the muscular pedicle serves not merely as a suspender, but also as a complex lever for directing the body. Individuals are usually found on the floating weed, either on, or very near, the surface of the water where crustaceans and other small organisms abound. They are very voracious, even in captivity, and greedily seize with one or more tufts of tentacles anything coming in contact with them. A human finger, or the point of an ivory paper-knife, is caught with sufficient energy to permit an experimenter to drag the lucernarian about for a

considerable time before it relaxes its hold upon its hoped-for victim. One has to consider the fact that in an adult there are eight grasping tufts, that each tuft bears from eighty to a hundred capitate tentacles, every one charged with nematocysts or stinging-thread cells, and that the conjoint use of six hundred to eight hundred stinging tentacles proves a formidable battery in capturing prey. A full-grown specimen measures one and a quarter inches in length and about one and a quarter inches in diameter across the expanded bell mouth. The interior appearance of the bell is shown in the diagram, Fig. 2, where the genital bands, containing numerous white masses of eggs, radiate from the mouth to alternate marginal bays. The oral cavity, said to be square-shaped, is not really so, but having four attachments corresponding to the genital bands, it produces an impression of squareness. This mouth is very extensible and moveable; it can be swayed about freely, altered in shape, thrust outwards or withdrawn, according to need. As in anemones there is a mesenteric cavity and gastral filaments for digestive purposes. The peculiar hand, or claw-like shape of the eight tentacle-bearing processes, makes up for the lack of a circumoral musculature as provided in anemones, for, singly, each claw can convey food within, and, jointly, the turning in of eight such claws closes the exit, and prevents escape, till the mouth organ engulfs the quarry.

All specimens of *Lucernaria campanulata* examined were charged with egg masses, and it is not unreasonable to suppose their advent here is connected with spawning, and that another opportunity of securing them may be far distant. Last year, for instance, the sea-hare, *Aplysia punctata*, occurred in phenomenal abundance, deposited countless egg coils, and disappeared. This year only one small sea-hare has been seen.

The Lucernarians of the South Coast (*Halicyclotus octoradiatus*) differ in many respects from *Lucernaria campanulata*. They choose the long green blades of *Zostera* for attachment instead of *Halidrys siliquosa*. *Zostera* beds are not found at Scarborough; *Halicyclotus* is conspicuous by its absence.

—: o :—

Eucosmia undulata is recorded for Carlisle in *The Entomologist* for April.

The "coming of age" of the *Irish Naturalist* was celebrated by a dinner on 23rd April.

Mr. J. W. Jackson records the remains of the Lynx from Derbyshire, in *The Geological Magazine* for June.

Mr. M. W. Compton records seeing a Whinchat at Ottringham, East Yorks, on 3rd January, in *British Birds*.

Mr. W. Denison Roebuck has presented his collection of English stamps to the Leeds University. It is one of particular importance.

Naturalist,

PHAEANGELLA EMPETRI (PHILLIPS) BOUD.
 (= *PHAEANGELLA SMITHIANA* BOUD.)*

C. CROSSLAND,
Halifax.

It appears that this interesting discomycete was first described by Mr. W. Phillips under the name of *Cenangium empetri*, n. sp., from specimens found by Professor Trail on leaves of *Empetrum nigrum* in Orkney, August, 1888. Phillips's description was published in *The Scottish Naturalist* for April, 1891, page 89, and remained there unnoticed until Professor Trail drew Miss A. L. Smith's attention to it in September, 1912, as being most likely the same fungus described and figured by M. Boudier in *Trans. B. M. Soc.*, Vol. III., Part 2, page 81, Plate IV. (1908-9), from specimens collected on similar host-plants in Ayrshire by Mr. D. A. Boyd, and in Ross-shire by Miss Smith. Phillips's collection of fungi being in the British Museum, Miss Smith was able to re-examine the type specimen, and found, as Professor Trail suggested, the two to be identical. M. Boudier, through Miss Smith, has authorized the substitution of Phillips's prior specific name. See, *Tr. B.M.S.*, Vol. IV., Part 1, page 74.

It is rather remarkable that Phillips's diagnosis, and also the one drawn up by M. Boudier, were incomplete in respect to spore characteristics. Neither had noticed the dark olive-brown uniseptate mature spores, hence each placed their fungus in a genus with continuous spores. Probably both examined immature ascophores. M. Boudier amended his description. See *Tr. B.M.S.*, Vol. III., Part 5, page 324 (1911-12).

As stated in *Nat.*, July, 1912, the same fungus was found on *Empetrum nigrum* on Seamer Moor, near Scarborough, August, 1911, by Mr. T. B. Roe and sent to the writer. It has also been found by Mr. Roe on Broxa Moor. Considering all the circumstances in connection with this much-named discomycete it may not be amiss to publish herewith the description taken from the Scarborough specimens:—

Ascophores scattered, erumpent then free, sessile, subglobose then turbinate, disc at first concave then plane, $\frac{1}{6}$ - $\frac{1}{5}$ line across, dark olive, margin incurved at first then erect, uneven, exterior of cup blackish brown, coriaceous, vertically wrinkled, base half diameter of disc at maturity, cells forming sides of the cup linear below slightly expanding at the margin, 3-4 μ thick, outer dark brown, inner hyaline.

* See *Naturalist*, 1912, pp. 206-7.

Asci cylindric-clavate, curved, 140-165 \times 16-20 μ (widest part) walls thick, apex subtruncate with slightly depressed centre.

Spores 8, subuniseriate, filling the ascus, 17-20 \times 9-12 μ , smooth, elliptic, ends obtuse, hyaline when young and filled with irregularly sized globules, later the contents become homogeneous and gradually change in colour through pale yellow green to dark olive brown, continuous until deeply coloured, finally 1 septate, cells equal. Paraphyses profuse, hyaline, branched, linear throughout, 2-2.5 μ thick.

Hab.—On browned dead leaves of *Empetrum nigrum* still on the plant.

The ascophores vary from one to four or five on a leaf, mostly two to three, when dry they are stoutly pyriform; the asci vary in length and thickness, the ascus wall begins to disappear when the spores become coloured, the spore septum rarely makes its appearance while the spores are enclosed in the ascus.

It is certain to be found in other localities, if carefully looked for, on the underside of the host-plant.

Since the above was written, Mr. H. Waterworth, Halifax, has succeeded in finding the same fungus on *Empetrum*, on Sowerby Crow Hill, near Halifax.

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The Proceedings of the Liverpool Naturalists' Field Club for 1912 contain a detailed report of the Club's field meetings, together with 'A contribution towards a fungus flora of the hundred of Wirral,' both of which are from the pen of Mr. J. W. Ellis. The financial statement shows that the Club has a small balance in hand.

Volume XXXV. of the *Journal of the Derbyshire Archæological and Natural History Society* is a substantial publication, and well illustrated, as usual. It contains papers on archaeological subjects by H. Kirke, Rev. R. J. Burton, P. L. Gell, W. Smithard, Rev. J. M. J. Fletcher, Rev. J. C. Cox, Major Poynton and A. Carrington, and H. Vassall. The Rev. E. H. Mullins contributes a valuable report on the Ossiferous Cave at Langwith, with a list of the Vertebrate, etc., remains, and with appendices by Messrs. A. S. Kennard, B. B. Woodward, M. C. A. Hinton, and Professor A. Keith; there are the usual full and valuable zoological notes by Rev. F. C. R. Jourdain and H. C. Hayward, and W. S. Fox describes the remains of a human skeleton in Monsal Dale. The bones were those of a youth, and were found in a fissure, together with the remains of a sheep and goat. We rather fancy however, that Mr. Fox goes just a little bit further than the evidence allows, when he writes 'To my mind the facts suggest murder. It is fruitless to make wild guesses at the motive for such a deed. But if the poor boy was murdered by a fellow-Briton, his assailant would have every reason to wish to conceal his crime. He would be well aware that the boy's relatives would make a search. If he were merely dragged to the end of the fissure his whereabouts would soon be discovered. But if a dead sheep and goat were roughly thrown down close to him in that dark recess, it would be most improbable that any search would be carried further.' We still think that Mr. Fox might have given some suggestion for the motive for the deed!

THE collecting grounds around Kirkby Stephen naturally fall into two great types, the upper levels mostly on limestone varying in type from the Great Scar to the Yoredales; the lower levels mostly on the Permian with relatively luxuriant vegetation. For the upper levels examination was made of the districts of Nine Standards, Nateby and Hartley. In the lower levels Pod Gill and High and Low Stenkrith were visited. The smaller limestone screes were of particular interest, especially those just to the east of Hartley. Here there is evidence of loose limestone screes encroaching upon a stretch of open woodland with hazel, hawthorn, and occasional holly. Careful examination revealed the fact that the stones on the screes could be regarded as of three types. Some had evidently fallen some time ago and were mostly occupied by ants, at any rate where the substructure consisted of soil from the old woodland. There was no conspicuous amount of vegetable matter in this, and spiders were absent under the stones themselves. A second type had fallen more recently and had below it a large proportion of dead leaves and vegetable matter generally. With these were generally plenty of the pill-millipede and the snake-millipede (*Julus*), with small diptera and other insects. In these cases spiders were abundant. *Coelotes* or *Drassus* tubes of silk were found quite commonly. The third type of stone had fallen at about the same period as the last, but was either on other stones with no subjacent vegetable remains or had been so placed that no accumulation of leaves for leaf-mould had taken place. In this case no spiders occurred nor were there many small animals present. Careful search confirmed the fact that there was a distinct correlation between the number of spiders, especially of those with a settled home, and the amount of vegetable matter, the intermediate link in the reasoning being supplied by the small types feeding upon that vegetable matter and being themselves preyed upon by the spiders. A small saw-fly larva had been captured by *Tetrrix denticulata*, but from the very deliberate method in which it set about its meal the particular diet selected seemed to be unusual.

Appended is a list of the spiders and harvestmen identified, among which are specimens handed in to me by Messrs. Castle, Haigh-Lumby, and Haxby. Altogether thirty-one spiders and two harvestmen, or thirty-three arachnids altogether, were found, all in Westmorland.

Found on both levels:—

Amaurobius fenestralis Stroem,
imm. ♀.
Coelotes atropos Walck, ♀, ♂.
Tetrrix denticulata Oliv., ♂ nearly
mature.

Bathypantes concolor Wid., ♂.
Trochosa terricola Thor., ♀, ♂.
Lycosa pullata Clerck., ♀, ♂.

Found on the upper levels only, mostly limestone :—

<i>Oonops pulcher</i> Temp., imm. ♀.	<i>Xysticus cristatus</i> Clerck., imm. ♀.
<i>Drassus lapidosus</i> Walck., ♀, ♂.	<i>Tarentula pulverulenta</i> Clerck., imm. ♀.
<i>Hahnina montana</i> Bl., ♀, imm. ♂.	♀.
<i>Erigone dentipalpis</i> Wid., ♀, ♂.	<i>Heliophanus cupreus</i> Walck., ♂.
<i>Wideria antica</i> Wid., ♀.	
<i>Walckenaera acuminata</i> Bl., ♀.	HARVESTMAN :—
<i>Epeira diademata</i> Clerck., imm. ♀.	<i>Megabunus insignis</i> Meade.

Found on the lower levels only, mostly Permian subsoil with some alluvium :—

<i>Clubiona reclusa</i> Cambr., imm. ♂.	<i>Pocadicnemis pumilus</i> Bl., ♀.
<i>Cryphoea silvicola</i> C.L.K., ♀.	<i>Ceratinella brevipes</i> Westr., ♀.
<i>Stemonyphantes lineata</i> Linn., ♂.	<i>Pachygnatha degeerii</i> Sund., imm. ♀.
<i>Linyphia peltata</i> Wid., imm. ♀.	<i>Meta segmentata</i> Clerck., imm. ♀.
<i>Labulla thoracica</i> Wid., imm. ♀.	
imm. ♂.	HARVESTMAN :—
<i>Bathyphantes variegatus</i> Bl., imm. ♀.	<i>Platybunus triangularis</i> Herbst.
<i>B. nigrinus</i> Westr., ♀.	
<i>B. dorsalis</i> Wid., imm. ♀.	MITE :—
<i>Maso sundevallii</i> Westr., ♀.	<i>Ottonia clavata</i> .
<i>Edothorax retusus</i> Westr., ♀.	

On the Yorkshire side we obtained *Leptyphantes ericaea* Bl., ♀.

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The Vertebrate Skeleton by **Sidney H. Reynolds**. Cambridge University Press, 1913, second edition, pp. xvi. + 535, 15s. net. The first edition of Prof. Reynolds' 'Vertebrate Skeleton' was published in 1897, and since that time many important additions have been made to our knowledge of the subject. In the present work, which is considerably enlarged, both in the way of letterpress and illustrations, all the results of recent research are included. Prof. S. W. Williston has revised that portion dealing with reptiles. Students will find the work most reliable; the illustrations are frequent and well prepared, and the index is admirable. The volume forms one of the well-known Cambridge Zoological Series.

British Birds, descriptions of all the commoner species, their nests and eggs. **F. B. Kirkman, B.A.** T. E. and E. C. Jack, London, 96 pp., price 6d. Surely this must be the cheapest book upon British Birds that has ever been produced. It forms the 110th volume of 'The People's Books' published by the Messrs. Jack. Altogether the Author deals with 187 species and the information given is concise and accurate. The book should be very valuable for beginners in the study of bird life. Information is given as to whether the bird is resident or otherwise; where it breeds and its local movements. An excellent description is supplied of the plumage of both male and female, and in many cases of the nestlings, and the nest and eggs. Small sketches illustrate the text, many of which are quite good and some really excellent. We are sorry, however, to see that the author has, in many cases, adopted the new and absurd system of nomenclature. This is a pity, as the book is essentially one for the novice and should he take the trouble to master the scientific terms it will be a waste time, as there is no doubt that he will soon have to adopt a different and more sensible system. As an illustration, the Buzzard is designated *Buteo buteo buteo*, we might just as well refer to it as Buzzard, Buzzard, Buzzard. We can, however, find some consolation in the fact that beginners do not pay much attention to scientific terms.—R. F.

THE NEW 'FOWLER' AND YORKSHIRE COLEOPTERA.*

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E. G. BAYFORD, F.E.S.,
Convener of the Yorkshire Coleoptera Committee.

THIS supplement to Fowler's Coleoptera has for a long time been a desideratum. A careful perusal of the volume makes it obvious that a general notice would require more space than could be spared, and therefore we have in the main considered it from the standpoint of a Yorkshire Coleopterist. That it is 'Fowler' is of itself sufficient to commend it to every one who has realized the value of the five volumes which comprise the original work. Were it not for its familiar size, and the equally familiar names which bestrew its pages, we might be excused for taking it at first sight for a railway guide book or Police Manual, the abbreviation 'Supt.' having always been associated in our mind with 'Superintendent.' Here, however, it does duty for 'Supp.' or 'Suppt,' the usual abbreviations for 'Supplement.' Misspellings, too, are more frequent than one cares to see in a scientific work, e.g., 'Babbington' occurs three times, and 'Point of Air' (twice) provokes our risible faculties.

When the fifth volume of 'Fowler's Coleoptera' was published in 1891, Coleopterists in Yorkshire were few in number, and their study of the order a purely personal one. Little was known of it except what was done at excursions of the Yorkshire Naturalists' Union. As early as 1884 the late W. C. Hey, to whom we looked as our leader, commenced a list of the Coleoptera of Yorkshire in the Transactions. Apart, however, from his own experience, his records were perforce drawn from the work done by his father, the Ven. Archdeacon Hey, the indefatigable Scarborough entomologists Lawson and Wilkinson, and the more ancient records which found their way into Stephens's Illustrations and Manual and the Natural History magazines of the early part of the nineteenth century. Failing health obliged Mr. Hey to relinquish his work when the Staphylinidæ had been completed, and it was then, in 1897, on the initiative of Mr. W. Denison Roebuck, that the Yorkshire Coleoptera Committee was formed with the dual object of investigating the coleopterous fauna of the county and of completing the list of Yorkshire Beetles begun by Mr. Hey. By this time the published portion of the list had become obsolete in the sense that it did not give an adequate presentation of the state of our knowledge, and it was a moot point whether a supplemental list should be issued bringing the published portion up to date, or an entirely new list commenced. The scheme of the Victoria County History, embracing full accounts of the flora and fauna, provided an opportunity of publishing in a somewhat modified form a full list with localities of all the species recognized in Yorkshire up to that time. Since then this list has been carefully brought up to date year by year in the Annual Report of the Committee, which has been published in *The Naturalist*. These reports bear witness to the volume of work done in nearly every part of the county by the various coleopterists forming the Committee. A good list being in existence, one has a right to expect it to be consulted, but so far as can be judged from the records inserted in the Supplement, such has not been the case. *The Naturalist* itself, which caters for Yorkshire principally and the northern counties generally, has fared no better. Of course this neglect does not affect either *The Naturalist* or the Yorkshire List, but it does most effectively reduce the value of the Supplement. The distribution of species is a most important and instructive part of all phases of Natural History, and in proportion as

* 'The Coleoptera of the British Islands,' by W. W. Fowler, M.A., D.Sc., F.L.S., and Horace St. John Donisthorpe, F.Z.S., F.E.S. Vol. VI., Supplement. London: Lovell, Reeve & Co., Ltd., 1913, pp. xiv. + 352. Small paper edition, with three plain plates, price 18s.; large paper edition, with twenty additional coloured plates, price £2 8s. od.

the distribution given is complete so is the value of any work determined. Yorkshire is the largest county, its physical features the most varied, and its faunal contents most attractive from whatever point of view they are approached. In this Supplement only sixty odd species have Yorkshire records attached to them. Three of these are recorded from a locality which is possibly not in Yorkshire at all, but in Lincolnshire, and the irony of it is that two of the species are fairly common throughout our county, while the remaining one has not, so far, been found in it at all. Of the others some could not very well be overlooked, e.g., *Chaetocnema conducta*, taken by Mr. Horrell at Forge Valley. The coloured figure of this species is very fairly drawn, but, if my memory is not at fault, the colour of the elytra should be somewhat warmer in shade, and the sutural line thickened in a peculiar manner, which is not so apparent in the plate. Another figure of interest to Yorkshire Coleopterists is that of *Carpophilus sexpustulatus*, which is grotesquely incorrect. It is difficult to believe that the artist had a genuine specimen before him, shape as well as colour being noticeably inaccurate. It is too bulky and heavy-looking, and the colour nowhere near the real thing. To place this figure side by side with the beautiful one of the same species in Murray's monograph (Trans. Lin. Soc.) is to realize that in some inexplicable manner a mistake has been made. The text relating to this species would have been more accurate if *The Naturalist* for 1912, pp. 141-145, had been consulted. In that article I gave full details of all the occurrences, and showed that up to that time twenty-six or twenty-eight specimens had occurred in Yorkshire. In this Supplement the dual authors are not in agreement on the point, one giving the number as eight specimens, the other as ten. As shown above, both are wrong. One striking defect which will be apparent to others beside Yorkshire Coleopterists is the complete independence of each author's work. This elaboration without collaboration has naturally produced two bad features—unnecessary repetition and contradictory statements. An instance of the first-named is found on page 295, where is a duplicate of a sentence on page 172. A Yorkshire instance of the second has already been referred to; another will be found in the account of *Bagous petro*. At page 187 we read 'four specimens only have been taken since I captured mine, in company with Archdeacon Hey, on August 6, 1880,' while on page 310 we find: 'the only British specimens are one taken by Canon Fowler at Askham Bog and another by Rev. W. C. Hey in the same locality.' The former gives a minimum of five, the latter states definitely that there were no more than two. When we come to look into the matter more closely the confusion becomes greater. A note by Rev. W. C. Hey (*The Naturalist* for 1895, page 242) announces the finding of two specimens, 'the second and third of this species taken in Britain,' and adds that Dr. Sharp, to whom they had been sent, had returned them named *Elmidomorphus aubei*. Canon Fowler, however, while leaving the species in *Bagous* decides that it does not belong to that genus but to *Elmidomorphus*, a genus very closely allied with it.

Whatever may have been the method by which records have been selected for insertion, that they should increase the value of the original work by modifying or amplifying the distribution as there recorded seems to have been lost sight of. From a host of others the following instances are cited:—

Blechnus maurus, 'not found towards the north' (I., 145).

Atemeles emarginatus, 'I know of no locality further north than Lincoln' (II., 54).

Prognatha quadricornis, 'not recorded from the North of England' (II., 434).

Dorcus parallelipedus, 'Church Stretton, Cheshire [recte. Shropshire]. It appears to cease further north' (IV., 6).

Saperda populnea, 'Lincoln, Langworth Wood; I know of no record . . . further north' (IV., 253).

These comments were quite correct when published, they are incorrect now, but as they are not corrected in the Supplement the work now conveys to the reader a false impression of the distribution of these species in the British Isles. The following records are from the list in the Victoria County History unless otherwise stated:—

Blechnus maurus, Humber Bank, T.S. (*The Naturalist*, 1909, 352).

Atemeles emarginatus, Near Doncaster (H. H. C.) (47th Ann. Rep. Y.N.U., p. 20).

Prognatha quadricornis, Raincliff Wood, near Scarborough (R.L.), Croft (G. T. Rudd), near Doncaster (H. H. C., E. G. B.).

Dorcus parallelipedus, Studley (E. A. W.), Huddersfield (G. T. Porritt), Conisborough (H. H. C.), near Doncaster (H. H. C., E. G. B.).

Saperda populnea, Askham Bog (M.L.T.), near Selby (C.D.A.), Meanwood, near Leeds (W.D.R.), Askern (A. R. Heath).

Further evidence of lack of Teutonic thoroughness is on page 283, where *Leptidea brevipennis* is recorded from 'Huddersfield (Mosley).' In *The Naturalists' Journal* for 1898 is an article on this species by Mr. E. A. Newberry [*sic*] I had communicated to Mr. Mosley that I had taken the species, along with *Gracilia minuta*, in a fruiterer's warehouse in Barnsley, and in consequence he appended a note, '*L. brevipennis* is not uncommon in some of the fruit shops in Barnsley' (italics mine). Mr. Newberry repeated the remark (E.M.M. for 1899, page 292), and there is little doubt that it is this record which in the Supplement is given to Huddersfield. Frankly, this portion of the work, which is about one-third of the whole, cannot but be disappointing to Yorkshire Coleopterists, because they know that a large body of useful material has been ignored. They know of Yorkshire specimens of *Corymbites metallicus*, *Pyropterus*, *Crypticus*, *Heliopathes*, *Phaleria*, and *Clinocara*, and a host of others which this book ought to record and does not. It must also disappoint those Coleopterists who, while not in our county, are endeavouring to gain a thorough knowledge of the distribution of species in these isles, and naturally expected to find the space devoted to records which would bring the recorded distribution up to date. The value of this part of the book will be found in what may be called the 'asides' of Mr. Donisthorpe, an illuminating remark here and there which marks him as a keen observer of differentiating distinctions. This is his metier, and he does it succinctly and well. The remainder of the work, the foundation of it in fact, for which Canon Fowler is responsible, is quite in keeping with, and a fitting continuation of the preceding five volumes. That it has been possible to preserve the spirit of the work after an interval of over twenty years is of itself sufficient indication that when Coleopterists have become accustomed to its necessarily disconnected arrangement they will prize the Supplement as they have hitherto done the original work.

It may be as well to point out that two species not hitherto known to occur in the county are given Yorkshire records, viz:

Panageus crux-major L., Eastoft, Yorks (Crawshaw) (p. 203).

Grammoptera holmelina Pool, Yorkshire (E. A. Waterhouse). One specimen taken thirty years ago (p. 157).

This last would probably be in the Ripon district, where it is known Mr. Waterhouse resided for some time.

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Under the head of 'Where to find it,' in a recent Nature Study publication, we notice two entries, as the editors feel 'sure workers will be glad to be directed to what they want.' The second entry reads 'Cumberland and Westmorel'd (*sic*) Carb. Succ. Pls. mps. Q. J. Geol. Soc., December.' We certainly think a prize should be offered to the beginner who can say what it is he has found!

BIRD NOTES FROM THE YORK DISTRICT.

SYDNEY H. SMITH.

THE whole of March and the greater part of April 1913, was wet and stormy and the spring migration period was particularly distinguished by gales that were bound to act disastrously upon immigrant and emigrant species. Many were very late in arriving in their usual haunts, but in some instances, notably the swallow and the swift, the date of arrival was unusually early compared with previous years. The wheatear, a species that calls on passage, generally staying a few days, was never seen this season in one locality I know, possibly as a result of a favourable wind tempting them to continue their flight straight up country to their moorland haunts. The Landrail also put in an appearance several days before it was expected. Last year we had a record early date of arrival of the cuckoo. This season a corresponding fairly late date. Other records are:—

Chiff Chaff	York	March 16th.
Swallow	East Cottingwith	March 27th (3).
Swallow	East Cottingwith	March 28th (5).
Swallow	Moreby Park	April 14th.
House Martin	Moreby Park	April 14th.
Cuckoo.	East Cottingwith	April 17th.
Landrail	York	April 30th.
Landrail	Aldby Park	May 9th.
Swift	East Cottingwith	May 1st.
Swift	York	May 6th.
Blackcap	York	May 5th.
Redstart	York	May 5th.
Tree Pipit	York	May 5th.
Nightjar	Aldby Park	May 9th.
Willow Warbler	York	March 23rd.
Willow Warbler (numbers)	York	April 10th
Whitethroat	York	April 8th.
Sand Martin	Moreby Park	April 14th.
Cuckoo	Moreby Park	April 21st.
Cuckoo	Skipwith	April 27th.
Turtle Dove	Aldby Park	April 27th.
Yellow Wagtail	East Cottingwith	May 4th.
Spotted Flycatcher	York	May 5th.
Garden Warbler	York	May 5th.
Sedge Warbler	York	May 5th.
Pied Flycatcher	Castle Howard	May 6th.
Reed Warbler	Castle Howard	May 6th.

The first Lapwing's eggs (2) were taken at Wigginton on March 26th, and at Fulford (3) March 26th.

A big flock of geese and ducks, exact species undetermined, passed over York about 11 a.m. on April 23rd, they appeared to be flying N.E. but as they could not be seen the exact

direction was very difficult to define. Earlier in the evening there had been a tremendous rainstorm accompanied by S.W. gale.

Three pairs of woodcock have nested successfully at Aldby Park (Stamford Bridge) and in two instances the four young ones got safely away. The first young ones were discovered on May 1st. On April 19th and 26th I visited the heronry at Moreby Park and found there was an increase in the number of the nests this year, the total being 23. Several of the nests were examined and found to contain four or five young birds varying from seven days to fourteen days old. In company with Mr. Riley Fortune, I visited the heronry again on May 3rd; many of the young birds were then fully fledged, but all were sitting in the nests. On attempting to photograph them we found they were able to fly short distances and no doubt most of the youngsters would be on the wing by May 6th or 7th. One young bird missing his perch came down 50 or 60 feet to the ground. He then disgorged his last meal, which consisted of about 20 sticklebacks. Early in May some heavy rainstorms resulted in the flooding of the Derwent Valley and caused the destruction of hundreds of nests of snipe and redshanks. It is possible many of these birds will nest again as the eggs destroyed were mostly freshly laid, except in the case of green plovers which either were almost on the point of hatching or the young were already abroad. Several nests of wild duck, teal and shoveller eggs were spoiled, and for some weeks afterwards three pairs of shovellers were frequenting the neighbourhood of East Cottingwith. A few pairs of these handsome rare ducks are nesting at Skipwith and I trust they will be successful; nearly all the nests last year were destroyed by foxes. At Kirkham Abbey, on May 28th, I saw a nest of the grey wagtail containing five eggs. This is a rather rare species locally; also two pairs of coal tits, both of which were feeding young. In the neighbourhood the bullfinch and tree creeper were nesting.

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The Sixtieth Annual Report and Transactions of the Nottingham Naturalists' Society is commendably local in its scope. The Rev. H. Friend gives his second paper on 'Annelid Hunting in Notts.' Dr. Swinnerton writes on 'The Palmistry of the Rocks,' describing fossil footprints from the Permians of Mansfield, and Dr. A. J. Jackson has a lengthy paper 'On Some New and Obscure British Spiders,' which is well illustrated.

The Report and Proceedings of the Manchester Field Naturalists and Archæologists Society for the year 1912, published 1913, pp. xvi. + 89. This, the fifty-third year's report, is an account of the Society's meetings and excursions, largely historical, mainly botanical. All are in abstract and many have little reference to the Manchester area. Still, the volume may bring pleasant memories to those who took part in the excursions. We are glad to notice that the advertisements (for pianos and optical instruments) are confined to two pages, but unfortunately one of those cannot be torn out as it is printed on the back of some matter which presumably should be kept in the volume, as the page is numbered.

FIELD NOTES.

BIRDS.

Peregrines at Bempton.—This year the Peregrine Falcons have returned to their usual site at Ravencliff, on the Bempton cliffs. There are two young ones, and it is pleasing to report that, as a result of the stringent watching that has been kept by the 'climbers' and others, the birds have been successfully reared.—E. W. WADE.

Dipper using same nest twice.—A Dipper built its nest on the rock above a small waterfall near Beamsley Moor. It has done this for several years past but this year the first lot of eggs was taken by someone. After a short interval the bird laid another clutch in the same nest and is now feeding a lusty brood.—R. FORTUNE.

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GEOLOGY.

***Macropoma mantelli* in the Lincolnshire Chalk.**—Among some of the fossils recently obtained from the large chalk quarry at South Ferriby, Lincolnshire, is a small object very much resembling a fir cone. I have not seen anything of the kind in the North of England chalk previously, but they seem to be known to the quarrymen, who call them 'fossil fir cones.' This particular specimen was obtained in the Lower Chalk at a depth of twelve feet below the *Belemnitella plena* zone. Mr. C. Davies Sherborn informs me that it is a coprolite of *Macropoma mantelli* Ag., and that it is not uncommon in the chalk of the south of England. So far as I can find, however, it does not appear to have previously been recorded for the Lincolnshire chalk.—T. SHEPPARD.

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ARACHNIDA.

***Gamasus ignotus* in Yorkshire.**—I have received another specimen of this curious Gamasid (see *The Naturalist* for March) from Mr. Winter, of Shipley. They were collected by Mr. Castle at Kirkby Stephen. This is another locality, consequently the mite may be widely distributed and perhaps not uncommon. In Mr. Soar's drawing no shoulder bristles are shown, and no doubt these had been rubbed off before Mr. Soar received the mite, but in this more recent specimen they are very much in evidence, and are long, straight, and pointed—dagger-like. This is of some importance, since Koch, in his *Uebersicht*, divides these mites into those with shoulder bristles, those without them, and those having shoulder bristles knobbed at the free extremity. Their absence may therefore be only accidental, in which case identification may be the cause of error in diagnosis.—C. F. GEORGE, Kirton Lindsey.

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T. SHEPPARD, F.G.S.

For details of the previous instalments of this Bibliography see *The Naturalist* for July, 1911, page 257, and May, 1913, page 152. The lists for 1910 and 1911 appeared in *The Naturalist* for 1912 (pp. 152-160, 188-190, 345-352, and 371-372). The Yorkshire items will be included in a Memorial Volume to the late C. Fox-Strangways, being published by the Yorkshire Geological Society, and now in the press, which is being edited by the present writer.

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According to the Forty-second Annual Report of the Bradford Libraries, Art Gallery, and Museums Committee, the Natural History Museum during the year has been enriched by two hundred marine shells, a Dab Chick, Moor Hen, Corn Crakes, Little Owl; seventeen Liverworts, minerals, and fossils, and fresh wild-flowers; all gifts. Some additions have also been made to the 'Old Bradford Room.'

A second-hand bookseller's catalogue is not usually a source of amusement, but the following description, taken from a recent Birmingham bookseller's list, is evidently an inspiration on the part of the compiler:— 'Blackpool in 1840.—A Very Fine Water-Colour Drawing, by F. McCallum, of Blackpool Beach, signed and dated. In the background can be seen the Houses, in the foreground is the Beach, upon which is a Boat, whilst to the right of the Boat is a Donkey, upon which a Man is sitting; in front of the Boat is a cart being drawn by two Donkeys, and in the Cart are two Women; a Man is walking by the Donkeys, holding the reins, and a Woman is walking by the Cart; mounted, size of Water-colour, 9½ by 7 in., size including mount, 16 by 11 in. Bargain.'

YORKSHIRE NATURALISTS AT BURNSALL.

BURNSALL proved an admirable place for the gathering of the Union on the 7th June. The geologists assembled in strong force. Under the able guidance of Dr. Albert Wilmore they carried out the whole of their programme. The zoologists, led by Messrs. H. B. Booth and Thomas Roose, worked the valley of the Wharfe from Grassington to Burnsall, finishing the day in the woods and on the fells to the right of the Barden Road. Like the entomologists, they blamed the prevalent high wind for the paucity of their records.

Under the guidance of Mr. C. A. Cheetham, the botanists investigated Trollers Ghyll, passing over the moor to the left of the ghyll, and returning by way of the Hartlington Valley.

The President of the Union, Mr. Harold Wager, F.R.S., took the chair at the meeting held at the close of the excursion, when sectional reports on the day's work were presented, and thanks accorded to the Duke of Devonshire and Colonel Dawson for permission to visit their estates; to Mr. Riley Fortune for making the local arrangements, and to the guides.

VERTEBRATE ZOOLOGY.—Mr. H. B. Booth writes:—Mr. Roose set several small traps the day previously, at various altitudes near to Burnsall. These yielded the long-tailed Field Mouse, the Bank Vole and the Common Shrew. The Water Shrew was not taken; but plentiful evidence of its presence was seen by the number of scales and tails of small fishes near the entrances to its burrows. An unexpected 'catch,' however, was in a trap that had been set in a small dell near to the village. It had been 'sprung,' and contained the rough drawing, on a plain card, of a mouse with its mouth at the bait of cheese, and tied on with black hosiery yarn. Inscribed on the body of the mouse was a too familiar phrase about Votes, being no doubt a 'joke.' Pied Flycatchers were noted at about a mile below the village, near the point which marks the limit of its known breeding range in Wharfedale. Among other birds seen or heard were the Yellow and Grey Wagtails, Goldcrest, Bullfinch and Common Sandpiper. Quite close to the village was a Dipper's nest, beautifully hidden in a small clump of ivy, at which the birds were feeding their young.

A pair each of Sparrow Hawks and Magpies (both uncommon birds in this neighbourhood) were hung on the keeper's 'gibbet,' all recently shot. The Merlin 'ground' on which a pair of these birds has attempted to nest, and has as regularly been shot at the nest for two or three generations of game-keepers, is this season untenanted. A visit was paid to the top of the moor where Vipers are occasionally seen, and where they were formerly common. But in spite of the hot sun, the wind was so strong on these exposed parts that not a single Viper had

apparently ventured into the open. We had, however, the satisfaction of seeing the havoc wrought on these moors by the cloud-burst of five years ago; where gullies more than twelve feet in depth had been formed in the course of a few hours.

CONCHOLOGY.—Mr. J. E. Crowther writes:—Starting from Bolton Abbey station the conchologists visited Trollers Ghyll. The only live water shell noted during the day was *Limnæa pereger* in the conduit belonging to Skyreholme Mill, though dead shells of this species, along with *L. truncatula*, were found on the site of the old dam. On a wall near the entrance to Trollers Ghyll, *Balia perversa* and *Pyramidula rupestris* were found sparingly, and in an adjoining wet place was *Agriolimax lævis*. Among the screes and the stones on the slope of the disused dam, *Cepæa nemoralis*, *Hygromia granulata*, *H. hispida* and *H. rufescens* occurred in small numbers. In the same locality *Arion ater*, with its var. *plumbea*, *A. fasciatus* and *Agriolimax agrestis*, both the common form and the var. *violacea*, were more or less abundant. On a wall by the riverside near Burnsall the var. *nigrescens* of *Helicigona lapicida*, in company with *Pirotoma cravenensis* was fairly plentiful. In the afternoon, near Lythe Plantation, a search was made for living examples of *Pomatia elegans*, dead shells of which have been collected many times, but although they were again fairly plentiful no live specimens were found, and the conchologists finally came to the conclusion that this species only occurs here in a fossil form and is washed out of the soil by the heavy rains.

Helicella itala, *Vitria helvetica*, *Cepæa nemoralis* and *C. hortensis*, *Helicigona lapicida* and others were all more or less common near this place. A noticeable feature was the large size of *Agriolimax agrestis* which was plentiful all over the district traversed. Altogether thirty-four species and four varieties were noted, viz., seven slugs, twenty-five land shells and two freshwater species, as follows:—

<i>Agriolimax agrestis</i> .	<i>Helicella itala</i> .
" var. <i>violacea</i> .	<i>Hygromia granulata</i> .
" <i>lævis</i> .	" <i>hispida</i> .
<i>Arion ater</i> .	" <i>rufescens</i> .
" var. <i>plumbea</i> .	<i>Helicigona lapicida</i> var. <i>nigrescens</i> .
" <i>intermedius</i> .	<i>Arianta arbutorum</i> .
" <i>hortensis</i> .	<i>Cepæa nemoralis</i> .
" <i>fasciatus</i> .	" <i>hortensis</i> .
" var. <i>subfusca</i> .	<i>Ena obscura</i> .
<i>Vitria pellucida</i> .	<i>Cochlicopa lubrica</i> .
<i>Vitria cellaria</i> .	<i>Lauria cylindracea</i> .
" <i>helvetica</i> .	<i>Balea perversa</i> .
" <i>alliaria</i> .	<i>Pirotoma bidentata</i> .
" <i>nitidula</i> .	" <i>cravenensis</i> .
" <i>pura</i> .	<i>Carychium minimum</i> .
" <i>crystallina</i> .	<i>Pomatia elegans</i> .
<i>Eucomilus fulvus</i> .	<i>Limnæa pereger</i> .
<i>Pyramidula rupestris</i> .	" <i>truncatula</i> .
" <i>rotundata</i> .	

FLOWERING PLANTS.—Mr. Wattam writes :—Trollers Ghyll proved an excellent working ground for the Botanists. In the meadows at the entrance to the ghyll was noted a fine array of *Orchis mascula*, and an abundance of *Ophioglossum vulgatum*. The ledges of the limestone scars were inhabited by such characteristic plants as *Thalictrum minus* L. var. *montanum* Wallr., *Arabis hirsuta*, *Galium sylvestre*, *Geranium lucidum*, *Poterium sanguisorba*, *Saxifraga hypnoides*, *Sax. tridactylites*, *Sedum acre*, *Lactuca muralis* and *Scabiosa columbaria*. *Geranium Robertianum* and *Festuca ovina* were common plants of the basal screes. Watercress, water avens, brooklime, and *Equisetum palustre* were common plants of the streamside, and the following sedges were noted in the moist situations :—*Carex Goodenowii*, *C. glauca*, *C. pilulifera*, *C. præcox*, and *C. panicea*. Within the narrow gorge *Draba incana* and *Hieracium murorum* were observed, whilst *Myosotis sylvatica* made a pretty picture. The shale areas were controlled by *Mercurialis perennis* and *Arum maculatum*. Noticeable features were many fine examples of Yew, Ash, and Mountain Ash which had established themselves within crevices of the scars. Ferns were also prominent, of the species *Asplenium Rutamuraria*, *A. viride*, *A. Trichomanes*, *Cystopteris fragilis* (with prothalli in situ), *Polypodium vulgare*, and *P. Phegopteris*. The refuse of the old lead workings was whitened with the blossoms of *Arenaria verna*, a double form being found by Mr. Gough, and here also occurred *Linum catharticum*, *Thymus serpyllum*, and *Hieracium pilosella*.

On reaching the head of the ghyll the limestone area, with its typical scar and scree flora, gave place to siliceous rocks and soils, and the vegetation consisted of dwarf bilberry, gradually passing into an *Eriophorum* moor with *Molinia cærulea* as a co-dominant species. *Sphagnum* was abundant over the moor, and other common associates were *Calluna*, *Erica tetralix*, *Juncus squarrosus*, *Scirpus cæspitosus* and *Deschampsia flexuosa*. This sharp transition was the more pronounced on looking backwards and noticing on the farther side of Trollers Ghyll the wide stretch of calcareous pasture with its typical grasses, *Festuca ovina* and *Sesleria cærulea*. On the moor where paring had been done it was noticed that *Calluna* was reasserting itself.

Hartlington Valley, through which courses the river Dibb, had a rich flora. A prominent picture was a group of spikes of the Butterbur in fruit, nearly a yard in height. *Antennaria dioica*, the blue, white, and deep pink flowered forms of Milk-wort, *Aira præcox*, and *Scolopendrium vulgare* were noted. The bog areas displayed a glorious wealth of *Primula farinosa*, *Pedicularis palustris*, *Pinguicula vulgaris*, and *Equisetum maximum*. Within the wood by the river side *Geranium*

sylvaticum, *Trollius europæus*, and *Crepis paludosa* were noticeable features of the flora.

MYCOLOGY.—Mr. C. Crossland writes :—Between twenty and thirty species of fungi, including Agarics, Polypores, Uredines, Pyrenomycetes and Discomycetes, all of common occurrence and wide distribution were sent me by Messrs. Malone, Broadhead, and F. A. Mason. Mr. Mason, however, a few days later wrote me that he had exposed three prepared dishes in the hope that spores floating in the air might be caught and developed on the gelatines prepared for them. Mr. Mason sends me the names of some of the fungi which have so far developed on the dishes :—

- | | |
|---------------------------------|----------------------------------------|
| 1. <i>Oospora lactis</i> . | 5. <i>P. olivaceum</i> . |
| 2. <i>Monilia variabilis</i> . | 6. <i>Botrytis cinerea</i> . |
| 3. <i>Aspergillus glaucus</i> . | 7. <i>Saccharomyces ellipsoideus</i> . |
| 4. <i>Penicillium glaucum</i> . | |

Nos, 1, 2, 5, 7, are not previously recorded in the Yorks. Fungus Flora. The beautiful *Thamnidium elegans* found on insect excreta has only one record in the flora.

Mr. Mason has three others grown on the prepared dishes not yet identified.

BRYOLOGY.—Mr. C. A. Cheetham writes :—The mosses seen in Trollers Ghyll were of the usual type associated with a limestone gorge. In the stream at the bottom of the valley *Eurhynchium rusciforme* took the main place with *Amblystegium filicinum* and *Hypnum falcatum* var. *virescens*. On the stones and sides of the stream were *Bryum pseudo-triquetrum*, *B. bimum*, *B. pallens*, *Philonotis fontana* and *Weisia viridula*. On the vertical walls of the ghyll the most interesting were *Trichostomum mutabile* var. *lophocarpum*, *Seligeria pusilla*, *Eurhynchium tenellum*, *Mnium orthorynchum*, and the hepatic, *Madotheca lævigata*.

Where tufa was being deposited *Weisia rupestris* and *Hypnum commutatum* were frequent. In one or two places *Encalypta vulgaris* was in fine fruit and on a solitary grit boulder in the midst of limestones a patch of *Ptychomitrium polyphyllum* was in good fruit, this moss is no lover of limestones and it was interesting to see it here, we did not meet it again even on the grit area. Above the limestones the mosses changed quickly, on the clayey banks of the stream, *Dicranella varia* was abundant and a small patch of *Bryum filiforme* was noted. The bed of the old Skyreholme dam had a fine growth of the var. *elatum* of *Mnium affine* and the grit rocks had *Dicranum scoparium* and *Campylopus flexuosus*, these two with the hepatic *Lophozia Flærkii* were the only rewards of a scramble up the grit scars above. While crossing the cotton grass area midst Sphagnum and *Polytrichum commune* we got a few tufts of *Polytrichum strictum*.

In the Hartlington Ghyll the same types were seen. On the tree trunks here and previously, *Dicranoweisia cirrata* was gathered in good fruit. Mr. H. E. Johnson submitted many of the critical species to Mr. W. Ingham, to whom thanks are due for verification.

NEUROPTERA AND TRICHOPTERA :—Mr. G. T. Porritt reports that in consequence of the violent wind it was quite impossible to work for Neuroptera and Trichoptera with any satisfaction. The district is a good one for these insects, but under the circumstances only the following were noted :—*Perla maxima*, *Chloroperla grammatica*, *Isopteryx tripunctata*, *Nemoura cinerea*, *Hemerobius micans*, and *Agapetus comatus*.

GEOLOGY.—Dr. A. Wilmore, F.G.S., writes :—Over a dozen geologists were met at Skipton where the general build of the district between Skipton and Rylstone was pointed out. The anticline at Hawbank Tunnell was clearly seen. On reaching Rylstone the party proceeded to Hetton where an old quarry with Tournaisian limestones dipping North at about 65° was inspected. Here several of the characteristic fossils were obtained :—*Syringopora reticulata*, *Caninia cylindrica*, *Orthotetes crenistria* and *Productus pustulosus* being the chief.

From Hetton, the party proceeded to exposures near Skelda Gate, where evidence of folding was seen. Here also more specimens of the above-named fossils were obtained, together with *Chonetes*, sp. The next exposures were at Winterburn where a large quarry showed abundance of *Caninia cylindrica*, and most of the other fossils were seen. *Michelinia megastoma* was also secured.

The party next walked back to Rylstone where a very fossiliferous quarry in the upper (Visean) limestone was visited. Here were obtained abundant specimens of *Zaphrentis amplexoides*, *Densiphyllum* sp., *Lophophyllum* sp. and some good Cephalopods, especially a good specimen of *Prolecanites compressus*.

The afternoon party was met at Rylstone station and numbered about 30. Cracoe Gill was first visited. Here the lower limestones are seen to be much disturbed. Upper fossiliferous beds of somewhat knoll type were examined at the upper end of the gill. Here were seen numerous Brachio-pods, Corals, and Polyzoa. The Pendleside beds, with their characteristic fossils, are seen almost in contact with the white limestones at this point.

The next exposure visited was the large quarry worked by Messrs. P. and W. Spencer, whose manager, Mr. Todd, kindly met the members and gave permission to inspect the rocks. Many fossils were seen here of characteristic knoll type. The writer gave some account of the problem of the limestone knolls and of the various explanations which have been offered.

The folded knoll beds of the railway cutting were casually examined, and then the party proceeded to Linton, to walk along the line of the Craven Fault in the direction of Burnsall. The evidence of the fault was pointed out, and the party spent some time in examining the folded beds near to Burnsall, those of Loup Scar especially attracting attention. He then gave some account of the relation of the Wharfe Valley to the Craven Fault and to the limestone and grit hills in the neighbourhood.

W.E.L.W.

—: o :—

Wild Birds through the Year. George A. B. Dewar. Herbert Jenkins, Ltd., London, 248 pp., price 5s. This is not, as one might imagine from the title, a diary of happenings in the bird world through the different seasons of the year, but a medley of delightfully written essays upon different phrases of bird life. All of them are good and show that the author is a keen and accurate observer. He is strong in his condemnation of the collector of rare eggs and the following remarks, referring particularly to the New Forest, are worthy of special attention. 'The rare-egg collector is the enemy of all who care for the forest. He is a child who never grows up, a child of constant mischief. I say deliberately that any man who buys for his collection an English specimen of a buzzard's or honey buzzard's egg, acts against the public interest. It is a graceless traffic.' These remarks may well be applied, not only to the New Forest, but to the whole of the British Islands, and to very many more species in addition to the Buzzard's. The author overlooks the fact that there are breeding places of the Gannet, off the British Coast, other than the West Coast of Scotland and the Bass.—R. F.

A Catalogue of the Lepidoptera of Northumberland, Durham, and Newcastle-upon-Tyne. By John E. Robson, F.E.S. Edited by John Gardner, F.E.S. After considerable but unavoidable delay, the last part of this Catalogue is before us. The delay has been occasioned by the death of the late J. E. Robson, after which Mr. Eustace R. Banks undertook to edit and see the part through the press. Then unfortunately Mr. Banks fell ill, and finding no chance of immediate improvement, after having had Mr. Robson's manuscript in his possession for nearly three years, requested the Council of the Northumberland Society (under whose auspices all the catalogue has been published) to relieve him of his promise. Mr. John Gardner was then requested to finish the work, and right well he has done it. As Mr. Banks had made critical notes upon the whole of the manuscript, it goes without saying that everything in the Part may be regarded as absolutely reliable. The Part deals with the Tineina and Pterophorina, the latter order entirely by Mr. Gardner, as Mr. Robson had left no notes on the group. At the end of the Part a short supplement by the Editor is given, containing the additional species and records made since the catalogue was commenced, and bringing the list up to the present date. In the introduction we are told that the total number of species for the area included is 1,169 or 56.7 per cent. of the known British Species, as against 66.9 per cent. recorded for Yorkshire. As the area of Yorkshire is double that of Northumberland and Durham, this is regarded as highly satisfactory. As we have said the editing has been exceedingly well done, and although much of the text is admittedly the work of Mr. Banks, it reflects the greatest credit on the late J. E. Robson, Mr. Gardner, and the Northumberland and Durham Society. It is indeed a good deal more than a Catalogue, for the critical and lengthy notes on many of the species (as for instance those on *Solenobia clathrella*) are most interesting and valuable. A very good photograph of J. E. Robson forms a fitting and appropriate frontispiece to the work.—G.T.P.

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ZOOLOGY.

GEOLOGY.

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AND
T. W. WOODHEAD, Ph.D., F.L.S.,
TECHNICAL COLLEGE, HUDDERSFIELD.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S
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T. H. NELSON, M.B.O.U., WILLIAM WEST, F.L.S.,
RILEY FORTUNE, F.Z.S.

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NOTES AND COMMENTS.

BOTANICAL SURVEY.

In December, 1904, a meeting of four botanists—Dr. W. G. Smith and Messrs. C. E. Moss, A. G. Tansley, and T. W. Woodhead, was held in Leeds at the house of the former, to consider the formation of an Ecological Society. The outcome was the 'Committee for the Survey and Study of British Vegetation.' This Committee, restricted to about a dozen members, has done valuable pioneer work, and the results of their investigations have been recognized by and have influenced the work of Ecologists both on the Continent and in America. The work in the main has consisted of primary surveys, and considerable portions of England and Scotland, also a part of Ireland have been surveyed. The work has also extended to more detailed and intensive studies of selected areas and the large amount of sound work accomplished reflects great credit on the members; a valuable summary of it is contained in Tansley's 'Types of British Vegetation.'

THE BRITISH ECOLOGICAL SOCIETY.

After an active existence of less than nine years, and largely from demands for membership by a wide circle of botanists, the Committee has resolved itself into the 'British Ecological Society,' founded in April last at a meeting held at University College, London. Many doubts have been expressed as to the wisdom of adding another to the long list of Scientific Societies. Certainly there is a limit to one's time and means and there is a danger of withdrawing support from older institutions. In the opinion of many, a wiser course would have been to add an ecological section to one of the existing societies, *e.g.*, the Linnean, but there are obvious difficulties to such a course. We can only hope that the new society will not only maintain its high reputation, but justify its formation by greatly extending its scope and usefulness. The fee for membership is £1 1s. per annum; 7s. 6d. for Associates, and Natural History Societies and Field Clubs may become affiliated by an annual subscription of one guinea.

THE JOURNAL OF ECOLOGY.

In anticipation of the formation of the British Ecological Society, the first part of the 'Journal of Ecology' was issued on March 1st of this year. The editor, well known to our readers by his work on Hepatics, is Dr. Frank Cavers. The aims of the journal are set forth by the President, Mr. A. G. Tansley, from which we learn that Foreign as well as British Ecology is included in its scope, and it is intended, by means of reviews and extracts to acquaint its readers with the main results recorded in the world's ecological literature. Professor F.W. Oliver gives some interesting 'Remarks on Blakeney Point,

Norfolk,' where he has founded an Ecological station and carried on for some time valuable researches on the Shingle Beach which has been acquired by the National Trust. Dr. Smith gives an appreciative account of Raunkiaer's work during recent years on 'Life Forms' and Statistical Methods. Mr. Tansley reviews at great length—Brockmann—Jerosch and Rübels, 'Classification of Plant Communities.' A paper by Mr. Clement Reid is given (read before the meeting of the British Association in 1911) on the 'Relation of the present plant population to the Glacial Period.' The remaining pages are devoted to notices of 'Publications of General Bearing' and work on British and Foreign Vegetation, also a list of recent ecological literature. The Journal, the first part consisting of 80 pages, will be issued quarterly by the Cambridge press, at the rather high figure of 5s. a part.

THE MUSEUMS ASSOCIATION.

What was certainly the most largely attended conference of the Museums Association, and what was generally stated to have been the most successful conference ever held by the Association, took place at Hull during the week commencing July 14th. There were representatives present from practically every museum of importance in the British Isles, as well as from Germany, America, and Australia. Mr. E. Howarth, F.Z.S., was the president.

HANDBOOKS.

In the way of literature also the delegates were well supplied, the Local Committee giving to each visitor a set of the Guides to the Hull Museums, tastefully bound in green cloth, and a large official handbook to the city, specially bound for the meeting, and containing portraits of the prominent officials of the Association and of the local Committee; descriptions of the Museums, Art Galleries and other places likely to interest the members. This was similarly tastefully bound.

PAPERS AND DISCUSSIONS.

In addition to the President's address, the following papers were read and discussed at the Conference :— 'Methods of Collecting,' by Mr. Thos. Sheppard; 'How we may show our Museums and Art Galleries to the Blind: a report on some experiments,' by Mr. J. A. Charlton Deas; 'A method of Fixing Specimens in Spirit,' by Mr. J. W. Baggaley; 'The Organisation of a Textile Museum,' by Professor Roberts Beaumont; 'The Decay and Preservation of Antiquities,' by Dr. F. Rathgen; 'Some Reflections on the work of a Museum Guide,' by Cecil W. C. Hallett, B.A.; 'A Museum Guide and his work,' by J. H. Leonard; 'Note on a Form of Inverted Electric Light,' and 'Lantern-Slides of Museum Objects in Colour,' by Mr. E. E.

Lowe; 'Curators and the Stone Age,' by Mr. Reginald A. Smith; 'Museum Notes at l'Institut Oceanographique de Monaco,' by Dr. F. A. Bather; 'Museums and Classical Studies' by the Rev. Professor Henry Browne.

THE SOCIAL SIDE.

The people of Hull seem to have excelled themselves in the way of hospitality. On the Tuesday evening, His Worship the Mayor (Alderman Brown) gave a reception and conversation in the Royal Institution, which was beautifully decorated for the occasion; during the afternoon the delegates visited Burton Constable by motor char-a-banc, where they were entertained to tea by Major Chichester Constable. On Wednesday the delegates were driven round the various museums and galleries in the city and were entertained to tea by the Wardens of the Trinity House. On Thursday the local committee invited the visitors to lunch and afterwards a visit was paid to the Driffeld Museum, Burton Agnes and Flamborough Head, partly by rail and partly by motor char-a-banc. At Burton Agnes Mr. Wickham Boynton kindly entertained the members to tea. In the evening was a successful smoking concert at the Royal Station Hotel. Friday was occupied by a river trip to Spurn, where the members landed and heard an address on the geology, archæology and natural history of that interesting area; and on this occasion His Worship the Sheriff kindly provided lunch and tea. These items, together with bands of music, free tram rides, etc. as well as the glorious weather throughout the conference, contributed towards a most successful gathering, and, with one exception, when the delegates paid part of the cost, the whole of the items were provided at the expense of the Local Committee.

THE MORTIMER MUSEUM.

Perhaps the most interesting announcement made during the Conference was on the night of the Association Dinner, when Colonel G. H. Clarke, of Hull, announced that arrangements had been made for the Mortimer Museum of Geology and Archæology to be given to the citizens of Hull. His Worship the Mayor explained this was due to the generosity of Colonel Clarke who had purchased the collection and presented it to the City on condition that a special building be provided for the reception of the specimens. This was agreed to. While we do not propose to divulge the exact amount that has been given for the collection, we may say that it reaches four figures.

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Part 9, forming the first part of the second volume of *Yorkshire Type Ammonites*, by Mr. S. S. Buckman, deals with *Ammonites vermis*, *foveatus*, *gubernator*, *subtriangularis*, *aculeatus*, *luridis*, and *nitescens*, all from the Lias.



Landslip at Robin Hood's Bay, looking North.
Taken from point 1 on map on Shrove Tuesday, 1913.



Landslip at Robin Hood's Bay, looking South.
Taken from point 2 on map on Shrove Tuesday, 1913.

down the face of the cliff, and have actually covered the outcrop of the Lower Boulder Clay.

In the year 1910 the heavy seas had done considerable damage to the cliff, and the margin was further in than it had previously

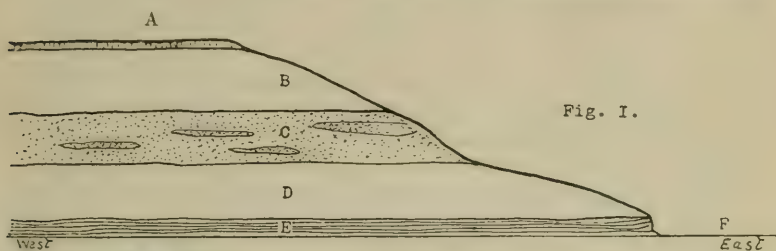


Fig. I.

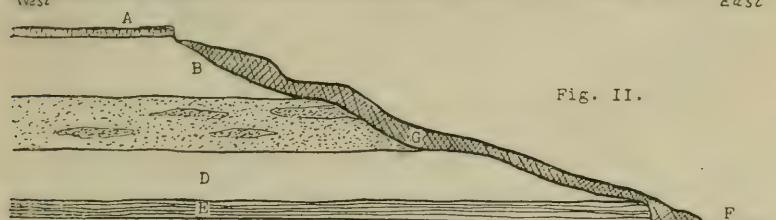


Fig. II.

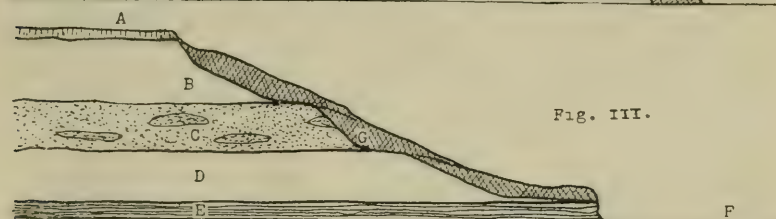


Fig. III.

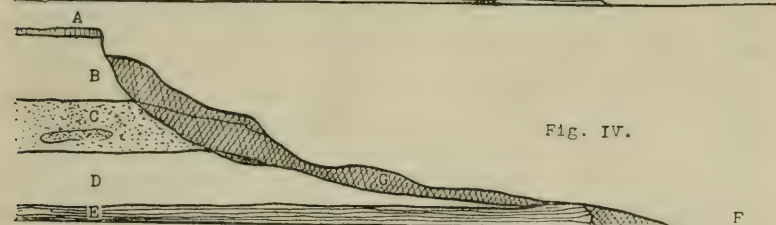


Fig. IV.

- A = Land under cultivation.
 B = Upper boulder clay.
 C = Middle sands, with patches of gravel.
 D = Lower boulder c'ay.
 E = Middle Lias (zone of *Ammonites armatus*).
 F = Beach. G = Slipped mass containing material from the three drift-beds.

been in the memory of many of the old fishermen. A good section of the sub-zone of *A. armatus* was exposed, and several specimens of this ammonite were procured. During 1910, however, a large amount of the Upper Boulder Clay and the

Middle Sands slid down gradually, and was finally thrust on to the beach as in Fig. 2. By the end of the year 1911, however, this was eroded by the sea, and the margin was restored to its original position as in Fig. 3. During 1912 and 1913 the upper beds have been again slipping as shown in the photograph, and the margin of the clay is now further out than it was in 1910 (Fig 4).

Assisted by the water from the fields above, and from the springs, the cliff proper resembles a tremendous chute, delivering excellent agricultural land into the sea, at the rate of many square yards per year! One of the peculiarities of this Middle Sands is the persistent occurrence therein of thin beds of coal pebbles. This coal is identical in structure with that found in the Lower Estuarine Beds which cap the hills around Robin Hood's Bay, and the whole bed is similar to what we might expect to be the result of the denudation of the Estuarine Beds.

It was in one of the gravelly patches of the Boulder Clay at Stoupe Beck, that I recently found a portion of a Mammoth tusk in good preservation. One side of it shows decided evidences of glaciation, and several geologists to whom I have shown it express the opinion that it is a genuine ice 'boulder.'*

Since the photographs reproduced were taken, the slipping of the cliff on the southern part of Bay Town has reached serious proportions. As may be seen by the map, most of the slipping has been in a seawardly direction, but owing to the high slope of the cliff above the Gas-house, a considerable amount of material has moved in this direction, as is shown clearly by the 'slickensiding' on the faces of the planes of movement. The effect of this movement is evident in the stables and warehouse marked X¹ where the furthest walls are bulging in an alarming manner, in one place projecting 10 inches from the jambs of the door. This bulging has taken place within the last seven months, and coincides with the movements of the cliff above. The Gasometer X² would also seem to be threatened, but up to the present there are no cracks in the solid surrounding retaining wall. On the seaward side the slipping has been much more extensive, and one house, marked X³ now occupied, appears unsafe for habitation.

The opinion has been expressed locally that the clay is now settled down, and that nothing is to be feared for many years to come. This opinion, however, I fear is not reliable, and if proper protection to the property has to be given, it must be in the form of a substantial wall, which would finally reduce the slope of the cliff and increase its stability.

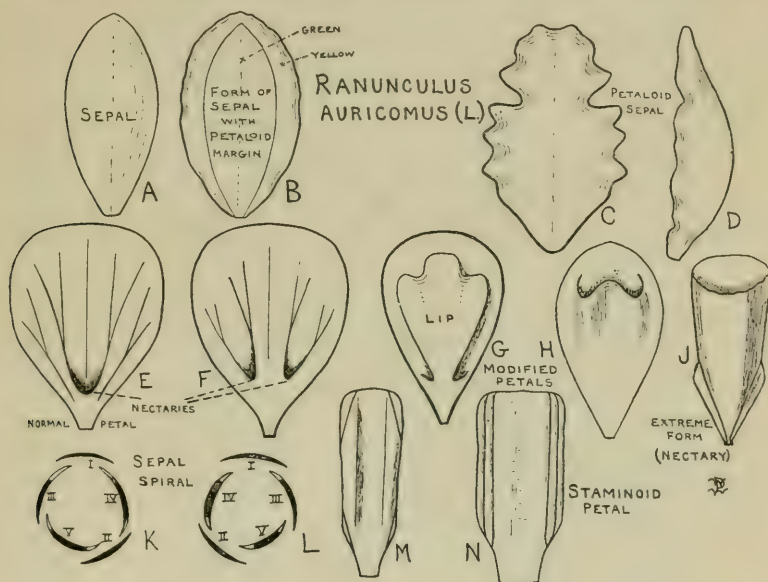
* Its good state is doubtless due to the fact that it was transported in a frozen mass. It is at present in the museum at Hull.—Ed.

VARIATION IN THE LEAVES AND FLOWERS OF GOLDBLOCKS. *RANUNCULUS AURICOMUS* L.

W. P. WINTER.

(PLATE XIV.).

ON the occasion of the visit of the Yorkshire Naturalists' Union to Kirkby Stephen there was ample opportunity for observation of this interesting spring flower. The following notes mainly describe the results of examining flowers obtained on

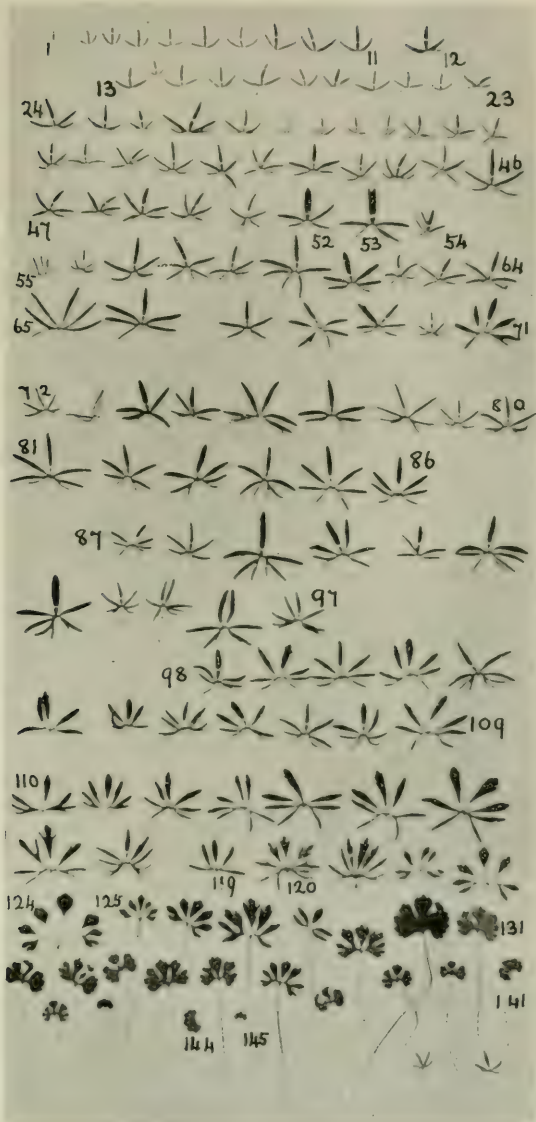


this excursion. The drawings are purposely diagrammatic, but the variations are easily found in all cases where there is access to a number of flowering specimens. At Kirkby Stephen *Ranunculus ficaria* L. was in full blossom, while *R. bulbosus* L. was beginning to flower and more sparingly still *R. repens* L. *R. acris* was evidently later. Hence there was no marked display of yellow buttercups in the fields, what golden colour there was being furnished by the ever abundant dandelion. But in the hedgerows and partial shade of the edges of the woodland *Ranunculus auricomus* L. held full sway. Specimens were obtained from a lane leading to Stenkrith and it was evident that these represented a fairly average set. The two points worthy of note are the great variation in the corolla,

and the vast range of leaf-form in the foliage-leaves. Plants examined in other localities on previous occasions led to the belief that there was some connection between the character of the variation and the locality in which the variety grew, but no evidence was obtained either way on this occasion. Three hundred and seventy-six specimens were examined in detail. The sepals were five in number in 345 cases, while the six sepals in 24 cases and seven occurring six times plainly owed their larger number to an ordinary duplication of one sepal or of two sepals. In only one case was the number of sepals reduced to four. It is evident that the number of sepals is remarkably constant and as a rule they were arranged on a $\frac{2}{5}$ spiral.

But in the corolla there is a great amount of variation in number, shape and appearance of the petals. In 91 cases there was no sign of petals at all, and in all of these the sepals had completely altered in general appearance; they were more papery in texture, somewhat larger, less leafy, and much yellower than in the typical sepals. These are shown in figure *C* from the front and *D* from the side. The edges were well-wrinkled and there was often a tendency to an obscure division into three parts as shown. No traces of nectaries were found.

In 88 other cases one petal occurred. In nearly all this was well-developed and typical in shape, as at *E*. The nectary was well formed. The ends of the semi-circular mouth were continued into the tissue of the lamina of the petal exactly at the veins next to and on either side of the middle one. As a rule the sepals on each side of the fully developed petal were green, like the type *A*, while those away from it were all more or less petaloid, some as in figure *B*, with a green centre and a yellow petaloid rim; and others more like *C* and *D*. Almost invariably the petaloid sepals became thin, yellow and papery, but did not acquire the almost waxy texture and glossy surface of the true petals. In 74 flowers there were two petals, while 42 had 3 petals each, and 32 possessed 4. In all these the tendency was for some of the sepals to be petaloid, and which of them were modified seemed to depend upon two factors. Frequently the alteration of the calyx took place in such of its members as made the whole flower more conspicuous. But in other cases the modification towards the petalised condition is much increased at the end of the spiral nearest to the petals or to the place where they would be under normal conditions. This is shown most plainly perhaps in the cases where there are two normal and three 'petaloid' sepals. In this case Nos. I. and II. of the spiral, whether direct or reversed (see Figs. *K*, *L*), are sepaloid, four and five are petaloid and No. III. is either wholly petaloid or in the instances where it is half petaloid, the petaloid wing was always observed on the side



Variation in Leaves of Goldilocks.

of No. III. nearer to No. IV. or in other words on the side of it approaching the corolla.* The positions could usually be made out quite easily so that it was not at all difficult to trace the spiral, as the sepals were distinctly not cyclic, in their insertion at any rate.

In 49 cases the set of five petals was complete. The full sized petals generally carried an indentation marking the position of the nectary though very often it was not functional. In rare instances two nectaries occurred and these were usually on the two lateral veins next to the centre vein.

But of greatest interest were those petals which had developed in the direction of a tubular nectary, sometimes functional, sometimes not. Of these some had a yellow lip on the inner side of the nectary, as in Fig. G; In others the growth had taken place to such an extent that the opening was much more to the distal end of the petal than usual as in H, and there was often a corresponding reduction in the size of the lamina; while in one case the petal had become a real tubular nectary.

In a very few instances the petals were almost staminoid, and sometimes these were really functional stamens, but of quite exceptional form, and still, from their position, really petals. Fourteen such modified petals occurred, some, as in M, with antheroid corners, and some as in N., with antheroid edges resembling on the whole stamens with very wide connectives.

The foliage leaves also showed wide variation. The examples illustrated were selected from a large number, and exhibit forms with at first three segments to the leaf (1-11). These are followed by some with three segments so toothed as to suggest a division into four (12-23) the proportional size of the tooth increasing in the series. From 24 to 51 are representatives of a numerous set beginning with four segments toothed as in 24, or three segments double toothed as in 25, leading up to five segments as in 46 which have a tooth increasing in size up to 51; 52-54 illustrate an increase in the depth of cutting from the simple tooth of 52 to the deep division of 54. From 55 to 66 are five segments with a tooth, and so on, the degree of division increasing up to No. 124, the latter indicating peculiarly long-stalked forms. All of these are cauline leaves.

The types from 125 to 145 are radical leaves with good stalks. The whole variation is of interest as arising in a member of the Ranunculaceæ for if the floral organs be studied one is reminded of types like the *Ranunculus* with a naked nectary (e.g., *R. aquatilis*). While with the growth of scales over the nectary of a less size than G is a suggestion of resemblance to *R. repens* and others. With the disappearance of petals and

* The 'petaloid' wing is shown in blank on the drawing.

the assumption of a petaloid character by the sepals, is a suggestion of types like *Caltha*, while the tubular forms like *H. J.*, strongly suggest *Helleborus*.

Even among the foliage leaves are many that are remindful of other plants. An average specimen has usually about three leaves of the types 1 to 118 on the stem well spaced, while there will be about four or five radical leaves with stalks, as in 119 to 145. The early forms occur high up on the stem and are highly suggestive of similarly situated leaves of the 'crowfoot' type formed in other *Ranunculi*. As we pass down we find forms (68, 77, etc.) resembling miniature *Hellebore* leaves. Some again (117 to 121) resemble *R. sceleratus*. In fact in many respects the variations resemble the larger variations from type to type that occur in the Order as a whole.

Examinations of the unopened buds did not reveal anything sufficient to cause the abnormalities, and unfortunately time has not permitted of observations on insect visitors and the connection, if any, between the nature of the modifications and the proportion of fertile seeds. This note may however, lead someone more fortunately situated as regards the habitat of this plant working out such points more in detail and helping to some decision as to whether this plant is really in a state of mutation as it sometimes appears to be.

Sepals.	Petals.	No. of Specimens.	Percentage.
5, (6, 7)	0	82, (5, 4)	24.2
(4), 5, (6)	1	(1), 80, (7)	23.4
5, (6)	2	66, (8)	19.7
5, (6, 7)	3	38, (2, 2)	11.2
5, (6)	4	30, (2)	8.5
5	5	49	13.0

Total .. 376

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Professor C. J. Patten writes on the discovery of a colony of tree-sparrows on Inishtrahull Island, co. Donegal, in *British Birds* for July.

In a note on *Trachyphlaeus digitalis* Gyll., an addition to the British list of Coleoptera, Mr. Newberry records having seen an example of the species taken by Mr. E. W. Morse at Boston, Linco. (*Entomologist's Magazine* for June).

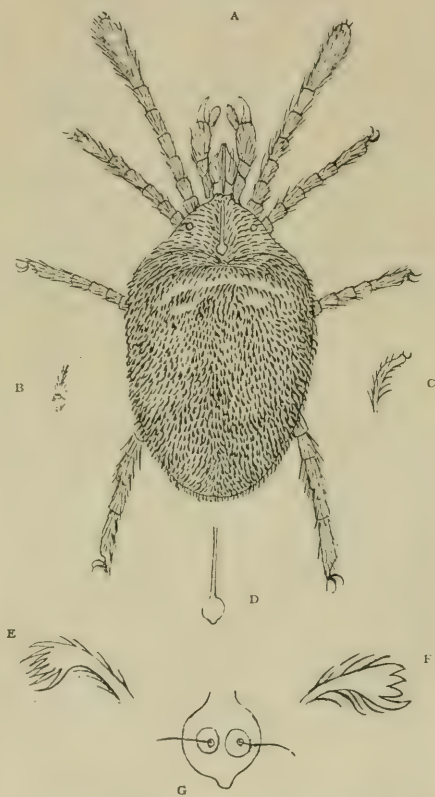
In the *Geological Magazine* for July, Dr. G. J. Hindle describes *Solenopora garwoodi*, a new species of calcareous alga from the Lower Carboniferous of Westmorland. In the same journal Mr. H. L. Hawkins describes the Lantern of *Perischodonus* from Clitheroe.

Mr. N. H. Joy describes *Atheta britteni*, n. sp., and *Trogophlaeus hemerinus* n. sp., two new Staphylinids, from Cumberland, in *The Entomologist's Monthly Magazine* for July. In the same journal Mr. E. Meyrick describes *Scoparia vajra* n. sp., from Chester.

Mr. R. Standen records *Ancylus fluviatilis* var. *gibbosa*, from Derbyshire, in *The Journal of Conchology* for July. In the same journal Mr. W. Denison Roebuck describes a case of perfect albinism in *Limax arborum*, and gives it the name 'var. nov. *albinos* Roebuck.'

A NEW MITE—*OTTONIA SHEPPARDII*.C. F. GEORGE, M.R.C.S.,
Kirton-in-Lindsey.

THIS small but elegant Trombidium does not appear to have previously been described and figured. Mr. Soar gives the length of the body as 1.36 mm., the crista (see figure *d*) differs from any I have yet described; its posterior termination is somewhat pyriform in shape (figure *g*), and there are two stigmata, each having a protecting hair. The hairs or papillae on the anterior part of the body are rather long, pointed at the distal end, and very plumose (see figure *b*), while those on the back and sides are curved, thickened at their free extremity, and palmate or digitate (see figures *c* and *f*). They are of a very beautiful ruby colour, and much of this colour is retained even when mounted in balsam, if the mite has not been kept very long in preservative solution. The hairs are also not very thickly crowded together. The legs are like those of most of these mites, the front ones the longest, with their distal end thickened and club-shaped; the other legs are rather thin and short. The claws are simple. The eyes have each two ocelli. The vulva is rather large in proportion to the mite, and has the usual three copulatory discs on each side. The claws of the palpi are double, as is common in the small species of Trombidium. I believe the



A.—*Ottonia sheppardii* n.sp. $\times 30$. Body length 1.36 mm.

B and C.—Hairs on papillae.

D.—Crista.

E and F.—Papillae highly magnified.

G.—Posterior end of crista.

mite is not uncommon, and is probably widely distributed, being doubtless overlooked in consequence of its small size. The type specimen, which will be placed in the museum at Hull, is from Canwick near Lincoln. I also have examples from Yorkshire localities,

I have named the specimen after Mr. T. Sheppard, who has done so much to advance the knowledge of the natural features of his native county, Lincolnshire.

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PALUDESTRINA JENKINSI IN FRESH WATER.

R. J. WELCH,
Belfast.

IN Mr. T. Sheppard's 'Lost Towns of the Yorkshire Coast,' page 264, I note his remark that this species may now be found in almost pure fresh water. In Ireland, though it often occurs in drains and marsh pools near the sea, mostly near or at river mouths, the majority of these habitats are really fresh water. Those that are not absolutely so seem much too fresh for *P. ventrosa* to live in. Apart from these, however, *P. jenkinsi* lives far inland in Ireland in a number of places in rivers not tidal or connected directly with the sea, such as the Upper Bann, near its mouth on Lough Neagh, and the mouths of the Blackwater and Six Mile Water rivers which also flow into Lough Neagh. This Lough, thirty miles long, drains out to the sea by the Lower Bann, but I have never found *P. jenkinsi* in it above Coleraine, *i.e.*, the tidal area. It was at the mouth, some miles below Coleraine and close to the sea that I first found the species, a new record for Ireland in 1893. This was in shell-pockets in the dunes, close to the river, and near this in brackish pools in 1897. The species, so far, has not been found living in Lough Neagh, even close to the rivers full of it which flow into the Lough, though in the late autumn and winter immense numbers of dead shells come out of the rivers in floods and occur in masses on the Lough shore. This is especially the case at the mouth of the Blackwater in Co. Tyrone.* In the Letterkenny River, which divides East from West Donegal, it is very abundant above the town, and far above salt water influences. Stelfox gives in his Irish List, † page 119, a map with its distribution in twenty-three counties in Ireland.

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Turtle Dove nesting near Harrogate.—This year a pair of Turtle Doves nested at Killinghall, and at the time of writing are incubating.—R. FORTUNE, July 19th, 1913.

* See Milne and Stelfox, *Irish Naturalist*, XV., p. 75, 1906.

† Proc. R.I.A., March, 1911.

MAIANTHEMUM BIFOLIUM SCHMIDT.

ARTHUR BENNETT,
Croydon.

IN the *Journal of Botany* for July, Mr. Jackson has an interesting paper on the above species. He there acts as a pleader for the plant as a native of Middlesex where it was found by Hunter in 1818, and indirectly impugns the nativity of the Yorkshire station (Forge Valley, near Scarborough). Hunter mentions it as growing in a wood (Caen or Ken Wood) with *Convallaria majalis*, *C. verticillata* and *C. Polygonatum*. These two latter species would seem to me to at once suggest doubt as to the other being native there. While the same argument that Mr. Wheldon uses with the Yorkshire plant, 'that the plant does not occur in other woods,' may be used with the Caen Wood plant, why does it not occur in Bishop's Wood, or other woods near or at the north of Caen Wood. Another thing may be urged, plants must have their range-end somewhere and it is quite possible the species may have been far wider distributed in England than at present. At the same time the planting of trees does introduce plants, and a fair guess may often be made as to how long the plants have been there by the age of the trees. Of course, being a species found over nearly the whole of Europe, it may quite well be native in Southern England. So far as the Yorkshire station is concerned a note by Mr. J. Backhouse, Junior, may be quoted.* 'It is growing in the utmost profusion among *Trientalis europaea*, *Vaccinium*, *Luzulas*, etc., on the slope of a steep brow covered with scattered trees. Suffice it to say that before knowing *where the plant was*, I decided where, *if it were a native*, it 'ought to be.' This was determined partly by the general configuration of the country, and partly by the kind of vegetation clothing the district, and proved quite correct. Never in Norway, did I see it more abundant or finer, that I remember. For a considerable distance the hillside is carpeted with it. It is not, however, the quantity merely, but as I said before the general circumstances and position of the locality, which leave no doubt whatever on my mind of its being a genuine native.'

But there is another thing, I think, which has been overlooked as to its being found. All the rules of the old records seem to accept without any doubt the idea that Gerarde's locality of 'Dingley Wood, six miles from Preston, in Aundernesse,' must be the Lancashire Preston as Gerarde so gives it; but I would suggest it may have been Preston in Holderness, in the East Riding? Can any local botanist suggest any place within six miles of that Preston now (or formerly in old documents) called Dingley Wood?

* *Phytologist*, p. 318, 1861.

Many old names are lost sight of, and sometimes only to be found in old documents, as I have proved.

It will perhaps be noticed that I give Schmidt as the authority for the name (which the L. Cat. last ed., has), while our latest Flora has *M. Convallaria* Weber (in Prim. Fl. hobat, 1780). Schmidt's name appeared in his unfinished work, 'Flora boëmica inchoata, 1793. T. I, Cent. 4,' he being the first to take up the Linnean name *bifolia*; Linneus putting it in the genus *Convallaria* (Sp. pl. ed. 1, i. 316, 1753).

Other references to the species as British will be found in :—

Phytologist, V. i, p. 579, 1843.

Proc. Berwick. Nat. Club, ii, 20, 1843.

Phytologist, p. 236, 1861.

Phytologist, p. 45 and 162, 1862.

N. Yorkshire (Flora), part 5, p. 381, 1892.

Science Gossip, p. 210, 1876.

Naturalist, p. 249, 1896.

Journal of Botany, p. 431, 1896.

Flora of Middlesex, p. 279, 1869.

Comp. Cybele Brit., p. 336, 1869.

Journal of Botany, pp. 202-208, 1913.

—◆◆— MOSESSES.

Oreas Mielichhoferi Brid., var. *elongata* B. and S. = **O. Mielichhoferi** (Funck.) Brid., var. *compacta* (Hornsch.) Braithw. Br. M. Fl.—In October, 1910, I had the pleasure of again finding, in Mudd's locality, this rare and interesting moss.—R. BARNES, Harrogate.

BIRDS.

Removal of Fæces from Bird Nests—A few years ago I was interested in the nest of a Common Wren, the young of which repeatedly passed out the fæces to the parent bird, deliberately waiting to receive them. This year two other cases of similar methods have come under my observation while in a photographic tent, the species in question being respectively a willow warbler and a yellow wagtail.—JASPER ATKINSON.

Merlin Mobbed by Wagtails.—At Bolton Abbey I watched a Merlin on the ground immediately close to where I knew the nest and young of a yellow wagtail to be. It was searching the ground carefully, and was being mobbed by the parent wagtails and three house martins. Mr. Roose went down to examine, and found all the young wagtails had been killed, but only one eaten. The remarkable feature seemed to me to be that this occurred on a very fine Saturday afternoon, with the usual number of visitors passing constantly less than 150 yards away.—JASPER ATKINSON.

PROMINENT YORKSHIRE WORKERS :

VI.—GEORGE MASSEE, F.L.S., V.M.H.*

BORN at Scampston, a hamlet in East Yorkshire, in 1850, George Edward Massee spent his youthful days on his father's farm. It was at this village where, to use his own words, "they attempted to educate me at a private school, but failed." It was intended that he should follow in his father's footsteps and be a farmer, so that on leaving school we see the youthful botanist performing the duties of ploughing,



George Massee, F.L.S., V.M.H. '

sheep washing, threshing, milking, and the like. It is to this practical routine work on the farm that Mr. Massee attributes a great deal of the success that he has achieved in plant pathology. Many of the so-called plant diseases are due to cultural defects. As a farmer's son Mr. Massee is able to give practical advice, and in this respect he has the advantage over the man of purely academic training.

But as a young man George Massee had ambitions in life other than that of being a farmer. He had a great liking for drawing and nature study. So it was that he was sent to the York School of

Art, where he was fortunate in gaining the national medal of the year for drawing flowers from Nature. At the same time he studied chemistry and physics. At this time he was taken in hand by his relative, Dr. Spruce, botanist and traveller, and when not ploughing or working in the sheep-fold he worked hard at botany. Massee's gift of drawing from Nature stood him in good stead, and the illustrations of Dr. Spruce's classical work on Hepatics are mostly his

* Reprinted from *The Agricultural Economist and Horticultural Review* by the kind permission of the Editor.

work. It was at Dr. Spruce's suggestion that Mr. Massee went to the West Indies and South America to study plants and collect orchids. He sent home *Oncidium macranthum*, the large golden-yellow flowered species, and one of the most handsome Orchids in cultivation; also *Nanodes medusæ* (Medusa's), an Orchid with lurid purple and deeply fringed flowers that give it a most sinister appearance. The Andes, notably the eastern slopes and the great Brazilian Plain are, in Mr. Massee's opinion, far less known than darkest Africa, and from a botanical and zoological point of view there is no corner of the world that offers such a wide field to the explorer and collector.

Among his many exciting experiences on this expedition were earthquakes. Being an only son, his mother prevailed upon him to stay at home on his return. So that we again see him dividing his energies between farming and botanical study, specialising in fungi and plant diseases. On his father's death he came to Kew and worked in the herbarium as a free lance, and in 1893 was appointed Principal Assistant (Cryptogams). During the twenty years that Mr. Massee has spent at Kew it is not too much to say that he has done more than any man towards elucidating mysterious fungus diseases. His name is as familiar and almost as widely known as the nefarious plant diseases of which he has made a special study. He has written books and voluminous articles in the leading scientific journals of the day. Among his most useful works may be mentioned the "Text-Book of Plant Diseases," which has been superseded by his "Diseases of Cultivated Plants and Trees" (1910), a work that is necessary for the proper equipment of every gardener, farmer, or forester. "British Fungi, with a Chapter on Lichens," is his most recent book, and this is beautifully illustrated by Miss Ivy Massee, his talented daughter. In collaboration with Professor Theobald he brought out the book, indispensable to rosarians, entitled the "Enemies of the Rose."

It is, however, as lecturer that Mr. Massee will best be remembered by those who have had the real pleasure of listening to him. He is a breezy Yorkshireman, and his perorations always ripple with good humour. He is beloved of Kew men, and an appreciation, obviously written by one who knows him well, appeared in the "Kew Guild Journal," 1908, from which the following extract is taken:—"No one who has heard George Massee lecture upon or talk about the department of science of which he has long been a past master, could think the subject uninteresting; on the contrary, they would probably say that it was as exciting as romance. . . . His method—if it be method, probably it is the man himself—is not to talk learnedly about things, the common fault of



ALL THE MOST



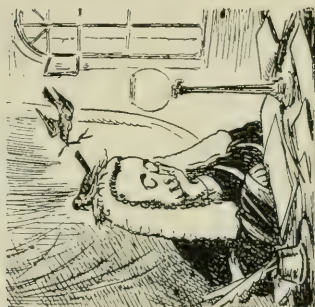
OBVIOUS



PLACES



FOR NESTING

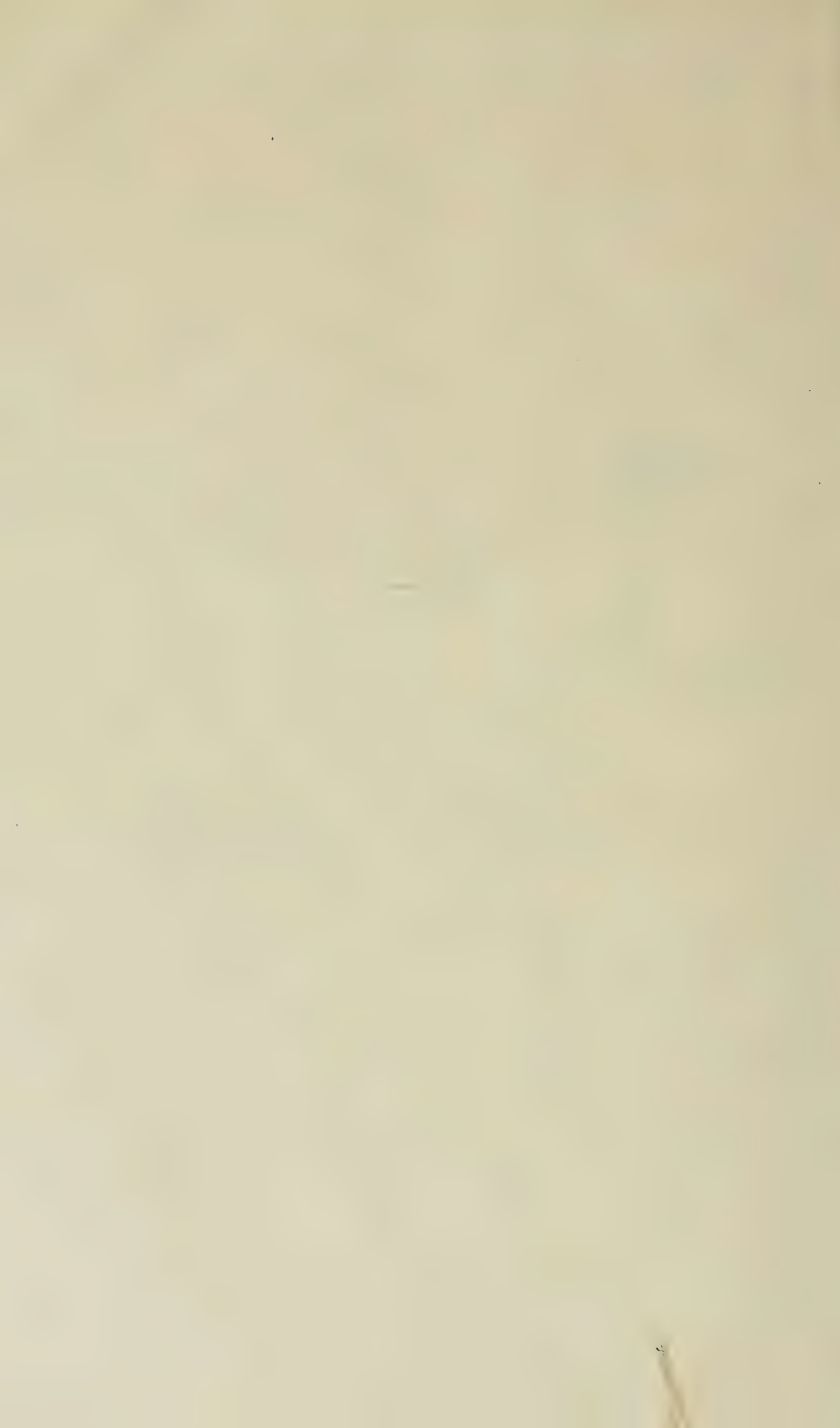


BEING OCCUPIED,



A LATE NESTER HAS HAD TO FALL BACK
ON AN OLD-FASHIONED TELL-IT-TO-THE-NEIGHBOR
IN THE NEWSPAPER WORLD!

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lecturers, but, as it were, to pitch the subject before his class or audience, get them all round it, and then help them by means of comment, explanation, joke, and gibe to take in as much of it as their capacity will stand." Few men know better than Mr. Massee how to sugar a pill, and however technical and otherwise uninteresting a subject may be, he has the happy knack of imparting it with good humour. The present writer well remembers a lecture by Mr. Massee on the diseases of fruit trees, wherein the lecturer impressed his hearers with the importance of keeping a constant lookout for the first signs of attack, concluding his remarks with the appropriate exhortation, "above all, watch and spray."

Although an accomplished man he does not seek the limelight, but would, in fact, rather hide his light under a bushel. It is only after repeated requests on our part that we are able to publish these notes and portrait. Like a true scientist, he is ever willing to acknowledge his indebtedness to fellow workers, attributing much of his success in mycology to his personal acquaintance with the Rev. M. J. Berkeley and Dr. M. C. Cooke.

Mr. Massee is a Fellow of the Linnean Society and many other societies, and in 1902 received the Victoria Medal of Honour in Horticulture—V.M.H.—from the Royal Horticultural Society, in recognition of his services in the interest of horticultural science.—H.C.

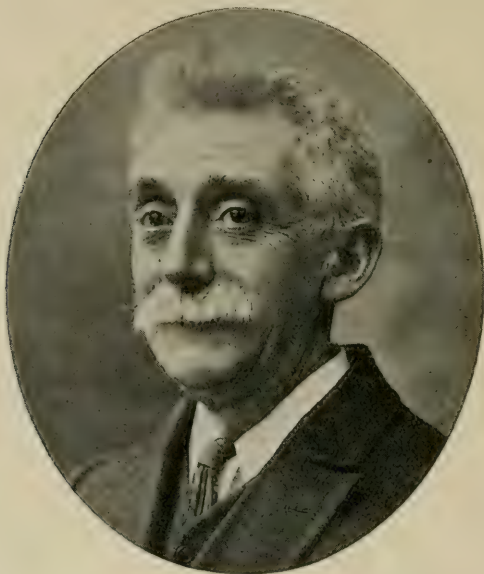
We have previously had occasion to draw attention to the fact that our contemporary *Punch* is drawing upon the readers of *The Naturalist*, instead of sticking to his last. Not only do we reproduce an illustration obviously intended for our journal, but we notice the following natural history items in one issue of *Punch*:—"A lady—Dr. Marie C. Stopes—has been appointed Lecturer on Fossils at London University, and there is an ugly rumour on foot to the effect that the subject of her first paper will be Man." "The elephant which Lord Hardinge was riding at the time of the bomb outrage at Dehli, has, in consideration of his steadiness on that occasion, been made a State pensioner. We understand, since the news has leaked out, that he has been pestered with unwelcome attentions on the part of fortune-hunters, and, with the view of putting an end to the nuisance, he would like it to be known in the elephant world that it is not his intention to marry." "At the request of Mr. Mawson, Mr. E. R. Waite, curator of the Christchurch Museum, has consented to prepare the report on the collection of fishes made by the Australasian Antarctic Expedition. Mr. Waite has in hand already the fishes which he collected at the Macquarie and Auckland Islands when he went to the Southern Ocean in Dr. Mawson's exploring vessel, the *Aurora*, last year.—*Christchurch Press*. We are prepared to congratulate Mr. Waite, to take off our hats to him—but we will *not* shake him by the hand." "Among the Caves and Pot Holes. Interesting visit to Clapham. (By "One of Them.")—*West Yorks Pioneer*. Oh to be a pot-hole, now that July's here."

[Mr. Waite was formerly curator of a Museum in England, at Leeds, in fact, and if Mr. *Punch* won't take him by the hand, we will, especially if there's a rare fish in it!—Ed.]

In Memoriam.

JAMES NEEDHAM (1849—1913).

MR. JAMES NEEDHAM, a noted all-round botanist of Hebden Bridge, passed away on Monday, July 14th. He had been confined to his room five or six weeks. An attack of influenza about Christmas left him with general debility affecting his lungs and very much reducing his strength. He came round sufficiently to go out of doors, but never regained his usual health. Almost to the last he spoke in a hopeful vein of being



James Needham.

able to get about again; a day or two before the end came he sent his son-in-law into Crimsworth Dean to find one of his favourite orchids. Mr. Needham was born at Hebden Bridge in March, 1849. By trade he was an iron moulder which he followed to about five years ago when he became incapacitated from doing heavy work.

¶ Along with a friend, the subject of our notice took up the study of flowering plants and ferns in 1885 as a result of a ramble to Hardcastle Crag under the auspices of the Hebden Bridge Co-operative Society, headed by a Rochdale naturalist. Their books were 'Withering's Botany,' from the library of

Naturalist,

the Mechanics' Institute, and 'Hayward's Pocket Guide.' In 1887 Needham's colleague discontinued these studies, but he himself 'kept at it' with keen interest, gradually adding to his pile of named dried plants.

About 1889 the present writer met with him and soon interested him in collecting fungi, as well as mosses and hepatics. He proved an excellent and most helpful guide throughout his exceedingly rich district, and scores upon scores of times have we hunted it together. For many years he never left me short of either fungi, mosses, or hepatics to work out at home. Whilst compiling the cryptogamic portion of the 'Flora of the Parish of Halifax,' Needham's help was invaluable. The extensive list of fungi owes much of its length to his zealous and skilful collecting. These combined investigations eventually resulted in the Hebden Bridge portion of the parish being worked for its fungi better perhaps than any other equal area in the Kingdom with the exception of Kew, and the Scarborough district.

Many of the species he found proved to be new to science, one being called *Gnomonia Needhamii* Mass. & Crossl. (*Pocillum Needhamii* Mass. & Crossl. was found by Mr. J. T. Aspin in Elland Park Wood). Numerous other Hebden Bridge finds proved to be new to the British Flora. All were recorded in *The Naturalist* from time to time. The last he found and determined about a couple of years ago was a beautiful little agaric growing on soil in a neighbouring greenhouse; it was known as *Lepiota medio-flava* Boud., only previously recorded in France.

In 1892 he drew my attention at Hardcastle Craggs to a yellow fungus on earthnut, and remarked that he had noticed where this occurred the neighbouring sweet-dock leaves were soon after affected with a brown one. This information brought the late Mr. H. T. Soppitt (then of Bradford) on to the scene, and led him to undertake the series of experiments which resulted in the discovery that they were two separate stages in the life history of one and the same parasitic fungus.

During one of his woodland investigations (February, 1897) he came across an old clothed hearthrug, probably a Christmas outcast. Remembering past conversations on fungi growing on damp sacking, decaying cloth, etc., he moved the old rug to a damp shady part of the wood with the idea of giving it a chance to produce something of the sort. Nor was he disappointed. It was visited at intervals, and when it looked like getting too dry the watering can was brought into play, although the water was to carry some distance. By the end of July no fewer than 10 observable species, and some in quantity, had matured and been identified. This was the first year's crop. Seven additional species came forward the year following. See *The Naturalist*, December, 1904, pp. 359-63, for particulars.

He was as much enamoured with the mosses as with the fungi; the former of which he could work at in winter. Though the moss flora of his district had been closely investigated by John Nowell, Todmorden; Samuel Gibson, of Hebden Bridge; A. Stansfield, Todmorden, and others, Needham succeeded in adding to the local flora var. *ampliretis* of *Philonotis fontana*, new to Britain; several types and varieties of mosses new to Yorkshire, and 14 or 15 others. In the liverworts *Jubula Hutchinsia* was a valuable new Yorkshire record. He was justly proud of this discovery, and visited the place several times each year, rejoicing to see it continuing to grow in great luxuriance.

Naturalists visiting the Hebden Valley and Crimsworth dean always found in him a cheerful, capable, and informative guide to the botany of those areas. Needham always used discretion as to what he should show them. From the *real* student of nature none of his discoveries were hid; to such he has often been very helpful in procuring material, fungi particularly, for special study. In recent years various Universities and Institutions have found in him a very able collector.

Many school teachers sought his assistance and he was never weary or chary of imparting to them the knowledge he had gained by hard and persistent study. He was always ready and willing to give his specimens to those likely to be interested in them.

He knew every nook and corner throughout the whole length of both the valley and the dean. For many years he had special leave from Mr. Lipscombe, Lord Savile's agent, to explore any part of the Savile estates.

He was greatly in request when Literary and Scientific Societies and kindred bodies visited the Hebden Bridge district. The following incident shows the esteem in which he was held. After a ramble in July, 1895, he received a packet with the inscription 'Kindly accept the microscope as a memento of a pleasant day spent in Crimsworth Dean on Saturday, July 6th, under your leadership, and as an expression of hearty good wishes for further successes in your researches for micro-fungi.— July 6th, 1895.'

His home became a treasure house of botanical specimens, mosses particularly, arranged with scrupulous care, and in them he took a great pride. The walls of his room were closely hung round with framed mounted specimens. Some years ago a few local gentlemen and Societies, on the initiation of Messrs. John Clay and Joseph Greenwood, combined and purchased Needham's collection. By permission of the Governors, the specimens were temporarily stored in the Secondary School buildings until some definite arrangements could be made to utilise them to the best advantage. At present they are vested

in the above two names. The late J. B. Brown, a life member of the Yorkshire Naturalists' Union, was one of Needham's practical friends.

We learn that his foundry mates used to laugh and banter him for a while, but this gradually changed to admiration and respect as his many finds became duly acknowledged in the mycological world.

Scientific books, mostly mycological, were presented to him at various times by admiring members of the Union, and by others who had come in contact with him. From 1891, when I invited him to join the Fungus Foray of the Union, he has not often missed a meeting. For some years he has been a valued member of the Mycological Committee. On the initiation of Mr. Gibbs and myself, it was through the efforts of this Committee, and other admiring friends connected with the Union, that just over five years ago he obtained an annual grant of £40 a year from the Murdoch Trust at Edinburgh, established for the benefit of worthy indigent naturalists.

In him the Union has lost a most interesting, and exceedingly useful worker. Among the many other qualities he exhibited at the Annual Forays was his early rising; he would be out betimes in quest of specimens, peering into corners and other out-of-the-way places where probably some of us would never think of looking. He considered his times at the forays to be red-letter days.

Needham was well acquainted with all the edible species found in his district, and made good use of them. When first he began to know these he showed them to friends, but soon learned better than to tell of all the whereabouts of toadstools good for the pot. Now and again he had gone to gather a few for himself, when the crop for the moment had been plucked, and he had to return home empty-handed.

Mr. Needham was slow of speech, but his earnestness was remarkable, and he was wont to express himself with amusing frankness in his native dialect, and with a quaintness all his own. He had a most genial disposition. Of educational advantages he had little, but zest in his hobby, a keen eye, an alert mind, and a retentive memory, acquired for him a wonderful store of botanical knowledge. All his spare time was given to his hobby, either in the field or at home. Often in summer he would rise early and have a look round before going to the foundry. During his twenty-eight years' nature studies he noted and catalogued between one and two thousand species, including flowering plants, ferns, mosses, hepatics and fungi. Apart from two papers in *The Naturalist*, and two others in *The Halifax Naturalist* in collaboration with the present writer, his written contributions are to be sought in the Hebden Bridge newspapers. He also

supplied a lengthy list of plants for a local guide to the Hebden Bridge district.

He was made a life member of the Hebden Bridge Literary and Scientific Society, and the Halifax Scientific Society. Many times Mr. Needham has entertained and instructed the members of both societies.*

In recent years he has often spent weekends at Stanbury on the invitation of Jonas Broadley, the versatile school-master, one of the first in this country in training school children in the outdoor study of nature. On these visits Needham has occasionally entertained the school children with his homely talks on toadstools and other works of nature.

Needham related some amusing stories concerning the remarks natives had made when he was collecting. One old farmer in whose pasture he was searching for *Clavaria rosea*, says:—"W'at, are ta on wi' that babby-wark yet? We hav'nt seen that pink thing tha'rt seekin' this year soa far.' On another occasion when searching for micro-fungi one friendly native asked another:—"W'ats Jimmy rooitin' for; has he lost sommat? Nay (was the reply) he's nobbut seekin' fun-gusses 'at he will'nt kno' he's fun, wol he gets a magnifying glass to see 'em wi' !' He was always treated by the Hebden Bridge people, high and low, with the greatest respect.

His last visitors were four bryologists, including Mr. D. A. Jones, Harlech, Wales, and Mr. Broome, Manchester, in quest of certain hepatics, September, 1912. Mr. Needham conducted them to a place where he knew two of them were to be found along with many others he had not investigated. They gathered freely, and in December sent him the results of their examination which pleased him very much, for about half-a-dozen were additions to our flora.

Mr. Needham was a convincing type of what an untrained hard working man may achieve in the study of nature by perseverance and close application.

He was interred at Birchcliffe Baptist Church, on Thursday, July 17th, 1913.—CHAS. CROSSLAND.

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Besides the Secretary's Reports, Lists of Officers, etc., the **Proceedings or the Cleveland Naturalists' Field Club, 1910-1911**, edited by the Rev. J. C. Fowler, and just published, contain illustrated obituary notices of the late T. M. Fallow and Henry Simpson; notes on local ecclesiastical antiquities by the late T. M. Fallow, the Rev. C. V. Collier and Mr. P. Huntington; borings in Kildale Carrs by the late Rev. J. Hawell; Cleveland Lichens by Mr. F. Elgee; Cleveland Lepidoptera, by Mr. T. A. Loft-house, and Cleveland Coleoptera, by Mr. M. L. Thompson. This part commences a new volume, and is an improvement upon its predecessors. It would be an advantage if the Proceedings had been lettered on the back.

* He was on the Halifax syllabus for a talk on Hepatics, Sept. 8th next.

YORKSHIRE NATURALISTS AT STAMFORD BRIDGE.

(PLATE XV.).

TYPICALLY rural are the surroundings of the historical village of Stamford Bridge which the Union had chosen for the occasion of their two hundred and forty-sixth meeting. The attendance was particularly good, fourteen of the affiliated Societies being represented. Though not offering any striking geological features, the geologists under the able guidance of Mr. J. W. Stather, F.G.S., journeyed to High Catton and there examined sections of the morainic materials well exposed in several gravel pits. For the general body of naturalists there was much favourable working ground, and with Mr. S. H. Smith as guide, they spent a profitable time along the left bank of the River Derwent, in Aldby Park, and particularly in Buttercrambe Woods. Headquarters were at the Bay Horse Hotel, where, after tea, the usual meeting was held, with the President of the Union, Mr. Harold Wager, F.R.S., occupying the chair. Sectional reports were given, and thanks accorded to Major W. H. Collins for permission to visit his estate, to the guides, and to Mr. Wm. Hewett for making the local arrangements.

VERTEBRATE ZOOLOGY.—Mr. Sydney H. Smith writes:—Mr. George Hall, the head-keeper on the Aldby Park estate, accompanied us, and assisted admirably in helping to make the excursion most successful. He informed me that on June 4th and 5th he saw a rough legged buzzard in Buttercrambe Wood. It was feeding upon the caterpillars of the oak-eggar moth that were dropping in large numbers from an oak tree. This is contrary to all accepted information as to the food of this species. Mr. Hall is very familiar with these birds, having shot them on the moors at Grantley. It was pleasing to hear that the buzzard left the neighbourhood without molestation. Attempts were made to obtain photographs of the fine herd of fallow deer in Aldby Park, but without much success. There were several newly-born fawns. The following is a list of the species observed upon the excursion:—

Mammals.—Fallow Deer (an introduced species), Fox, Otter, Stoat, Weasel, Hedgehog, Brown Rat, Water Vole, Hare, Rabbit, Mole, Squirrel, Short-Tailed Field Vole, Noctule and Pipistrelle Bat.

Birds.—In the brick pits near the village were the Coot, Moorhen, Reed Bunting, Sedge Warbler, Willow Wren. The marshy ground below 'Battle Flatts' affords a harbourage for Redshank, Green Plover, etc. In the woods and adjoining district were Mistle Thrush, Song Thrush, Blackbird, Redbreast,

Whitethroat, Willow Warbler, Sedge Warbler, Hedge Accentor, Long Tailed Tit, Blue Tit, Creeper, Wren, Pied Wagtail, Swallow, House Martin, Sand Martin, Goldfinch, Greenfinch, House Sparrow, Chaffinch, Lesser Redpoll, Linnet, Bullfinch, Yellow Bunting, Reed Bunting, Skylark, Starling, Magpie, Rook, Carrion Crow, Hooded Crow, Swift, Great Spotted Woodpecker, Cuckoo, Sparrow Hawk, Kestrel, Mute Swan, Mallard, Teal, Turtle Dove, Ringdove, Pheasant, Partridge, Landrail, Moorhen, Coot, Lapwing, Woodcock, Snipe, Redshank.

Reptiles and Amphibia.—Toad, Frog, Great Warty Newt, and Smooth Newt.

Fish.—The River Derwent is well stocked with fish, and the neighbourhood of Stamford Bridge enjoys a good reputation among 'brothers of the angle.' On this occasion were seen the Brown Trout, Pike, Chub, Roach, Dace. During the excursion Mr. Denison Roebuck and I caught a ten spined stickleback, a species I have not previously taken here. Close to Buttercrambe Bridge a magnificent Chub was found floating dead in the water, which is the largest Chub I have seen up to the present in the flesh, and the weight was estimated at from 7 lbs. to 7½ lbs. I submitted two scales from this specimen to Mr. P. D. Malloch of Perth. He states that the number of rings on the scales proves the fish to have been twenty years of age.

BOTANY.—Mr. W. Ingham, B.A., writes:—Most of the botanists took the left bank of the River Derwent as far as Buttercrambe Bridge and locks. Close by Stamford Bridge the dominant plants are two grasses bordering the edge of the stream, viz., the Reed Meadow Grass (*Glyceria aquatica*) and the Reed Grass (*Phalaris arundinacea*).

Farther along the river the dominant plant is the Great Hairy Willow Herb, a sub-dominant being a very fine growth up to five feet high of the Hemlock. Interspersed among the above are the Yellow Rocket, the Water Rocket, Valerian, Yellow Loosestrife, Mugwort, Tansy, Throatwort or Great Bellflower, Floating Persicaria, Marsh Woundwort, and the Water Figwort, the last plant very tall and with stems as thick as a walking-stick. Extending in a long straight line on the opposite side of the river is a little forest of the Common Rush, with stems also appearing as thick as a walking-stick. In the ditch by the side of the river the dominant plant is the Hemp Agrimony, and interspersed are the Skull-cap, Meadow Rue, Meadow Crane's-bill, Marsh Bed-straw, and the Great Hedge Bedstraw.

In wet places were the Yellow Iris, Water-Violet, and the Marsh Club-Rush.

Floating in the river were the large-leaved Shining Pond-



Photo by]

Buttercrambe Mill.

[Sydney H. Smith.



Photo by]

The Lock, Buttercrambe.

[Sydney H. Smith.

weed, the grass-like Fennel-leaved Pondweed, and the Yellow Water-lily.

On the mud and partly in the river were the rare Water-Rocket and the Flowering-Rush.

Near Aldby Lock were the Thyme-leaved Sandwort, Common Sowthistle, Mare's-tail, and the Great Branched Bur-reed. Passing through Aldby Park, we saw the Dogwood and the Rose-bay Willow Herb.

Buttercrambe Woods proved a happy hunting ground. Here two of the Fern tribe are exceedingly well-developed, the Male Fern and the Bracken. In one part was a fine growth of the Lady Fern, Spiny-Buckler-Fern, Broad Prickly-toothed Fern, Oak Fern, and the Beech Fern.

On the partly dried bed of a pool were two fine compact masses of the Narrow-leaved Cotton-grass, accompanied by abundance of Bog-bean, the Marsh Cinquefoil, and the stately Cyperus-like Sedge.

In another pool was abundance of the Great Reed Mace, commonly called the Bulrush, with many spikes gone to seed. On another piece of marshy ground were a few interesting plants, the All-Seed or Flax Seed, Bog St. John's Wort (both found by Mr. Cheetham), Creeping St. John's Wort, and the Bog Pimpernel. During the excursion three other St. John's Worts were seen, viz., the Hairy St. John's Wort, Perforated St. John's Wort, and the Marsh St. John's Wort. A fine specimen of the Marsh Lousewort was seen in the wood.

Near the keeper's House is a very large mass of Honeysuckle which was all in the yellow or second stage of its life-history.

The most interesting plant was shown by Mr. Mennell who found it some time ago, although it had been previously known for some time by certain members of the Friends' School, York. This plant is the Interrupted Club Moss (*Lycopodium annotinum*), the rarest of all our Club Mosses. On this occasion the solitary sessile clubs or spore spikes were seen on a few plants. The Buttercrambe Woods plant also agrees with a specimen I have from the Dovrefjeld, Norway. It is hoped that those who know the habitat of this rare Club Moss will protect it as much as possible.

MOSES AND HEPATICS.—*Hepatics*:—The only species seen are of the thalloid kind. These were *Conocephalus conicus*, *Lunularia cruciata* and *Pellia epiphylla*, the two former reported by Mr. Cheetham after the meeting.

Sphagna or *Peat Mosses*.—In the wood were three species at least, *S. cymbifolium*, *S. acutifolium* and *S. squarrosum* of very fine growth near the Cotton grass habitat.

True Mosses.—The dominant feature in the wood was *Leucobryum glaucum*. Some of the tufts were loose on the

ground and rounded into various shapes, some being exactly circular in outline.

In past years this moss grew to such a size on Strensall Common that Wilson, the great bryologist, mistook them at a distance for sheep. Other mosses seen on this occasion were *Barbula cylindrica*, *Eurhynchium rusciforme*, *Fontinalis antipyretica*, *Brachythecium rutabulum*, *Tortula muralis*, and *Grimmia pulvinata*, all at the Lock.

In the marshy ground in the wood where the Bog Pimpernel grows, Mr. Cheetham detected a small tuft of the rare moss, *Bryum erythrocarpum*—a new record for Buttercrambe Woods. The writer found this moss in abundant fruit on Strensall Common on 10th August, 1906.

On the muddy banks of the Derwent the Alga, *Botrydium granulatum* was frequently seen. This also occurs on the side of a pond near Skipwith Church. Both these habitats are in the East Riding.

By the roadside near Stamford Bridge the dried-up bed of a shallow pool was carpeted with the moss *Hypnum aduncum* var. *intermedium*, all brown and golden in colour.

MYCOLOGY.—Mr. W. N. Cheesman, J.P., writes :—Messrs. A. E. Peck, Fowler Jones, and the writer, proceeded on arrival to Buttercrambe Woods, where the day was spent. The dry condition on entering was somewhat disappointing, but on nearing the moist places along the lake side the collecting proved quite satisfactory, and a total of 60 species was the result. Some attention was directed to the species of fungi injurious to forest trees, three of which were somewhat conspicuous by the havoc they had wrought, viz. :—

Dasyscypha calycina causing the Larch disease.

Polyporus betulinus destroying the Birch trees.

Armillaria mellea killing several species of deciduous trees.

No sporophores of the last-named were observed but the black cord-like mycelium (*rhizomorphs*) between bark and wood on fallen trees gave unmistakable evidence of the foe.

Several other parasitic fungi (*Polyporus hispidus* on ash, *Hirnocla Auricula-judae* on elder, *Polystictus abietinus* on *Pinus sylvestris*, *Bulgaria polymorpha* on oak, etc.) were seen flourishing without any apparent inconvenience to the host plants. A fine sporophore of *Lenzites betulina* was found on alder with the hymenium surface in pores and gills, showing its intermediate position between the Agaricinæ and the Polyporeæ.

The odour of *Ithyphallus impudicus* was strongly in evidence in the moist parts of the woods, and at the meeting a collection of specimens was passed round showing the plant in all stages from the egg-shape beginning to the mature form then deodourised. Notable amongst the Mycetozoa was an abundant growth

of the rare *Amaurochaete fuliginosa* on felled pine logs showing all gradations of growth from the cream coloured plasmodium rising into strawberry-like æthalia turning pink, then crimson, eventually to sooty black. These colour transitions have not hitherto been noted by writers on these organisms and it is pleasing to record this phase in the life history of these strange plant-animals.

BASIDIOMYCETES.

Amanitopsis fulva.
Collybia platyphylla.
 „ *tenecella*.
Mycena galericulata.
 „ *haematopoda*.
Lactarius rufus.
 „ *subdulcis*.
Russula lepida.
 „ *mustelina*.
 „ *cyanoxantha*.
Marasmius epiphyllus.
Lenzites betulina.
Pluteus cervinus.
Polyporus squamosus.
 „ *betulinus*.
 „ *hispidus*.
 „ *chioneus*.
Fomes annosus.
Polystictus versicolor.
 „ *abietinus*.
 „ *perennis*.
Poria callosa.
 „ *vaporaria*.
Odontia fimbriata.
Thelephora lacinata.
Stereum hirsutum.
 „ *sanguinolentum*.
Hirneola auricula-judæ.
Ithyphallus impudicus.
Cyathus striatus.

ASCOMYCETES.

Dasyscypha virginea.
 „ *calycina*.
 „ *hyalina*.
Sphaerospora asperior.
Lachnea scutellata.
 „ *umbrorum*.
Orbilbia leucostigma var. *xanthostigma*.
Chlorosplenium aeruginosum.
Mollisia cinerea.
Bulgaria polymorpha.
Exoascus turgidus.
Hypoxyton cohaereus.

MYCETOZOA.

Physarum nutans.
Craterium minutum.
Leocarpus vernicosus.
Didymium difforme.
 „ *squamulosum*.
Stemonitis fusca.
Comatricha nigra.
Enerthenema papillatum.
Amaurochaete fuliginosa.
Reticularia Lycoperdon.
Lycogala epidendrum.
Trichia persimilis.
 „ *scabra*.
 „ *varia*.
 „ *decipiens*.
 „ *botrytis*.
Arcyria denudata.
Perichaena corticalis.

Poria callosa and *Hypoxyton cohaereus* have each only one previous record for Yorkshire.

CONCHOLOGY.—This Section was represented by Mr. W. Denison Roebuck, who writes:—The route was at first up the left bank of the Derwent, in division York S.E. *Bythinia tentaculata* was not uncommon in the still reaches of the river and a fine example of *Acroloxus lacustris* was found on a floating leaf of *Polygonum amphibium*. Among Sweet-Flags was *Succinea putris* in abundance, and in the axils of the leaves occurred *Agriolimax laevis* and young *A. agrestis*. In the coppices occurred juvenile examples of *Helix nemoralis*, and

Helicigona arbustorum taken by Dr. W. G. Fordham. *Hygromia hispida* was not uncommon, and the still reaches of the river towards Aldby Bridge, yielded *Bythinia tentaculata*, *Planorbis vortex*, *Pl. albus* and abundance of young *Sphærium corneum*, and Mr. Bellerby found a fine adult example of *Helix hortensis* var. *lutea* of the unusual band-formula 10345. Near the Lock a tree trunk turned over yielded no fewer than five different species of slugs, *Limax arborum*, *Agriolimax agrestis*, *A. lævis*, *A. intermedius*, and *A. circumscriptus*.

At Aldby Bridge the party crossed over into North East Yorkshire, and were guided by the head-keeper through Aldby Park and Buttercrambe Moor Woods. On this part of the route was found *H. arbustorum*. Mr. Greevz Fysher and Mr. A. Smith found abundance of *Helicella cantiana*, and Mr. R. Fowler Jones brought *Arion ater* var. *plumbea* and fine examples of *A. subfuscus* var. *rufofusca*.

Mr. A. Smith has observed, on the North Riding side of the district, *Hyalinia cellaria*, *Helix hortensis* var. *lutea* 00000, and *lutea* 12345 *arenicola*, and *H. nemoralis* var. *libellula* 10345 and *carnea* 10345, all at Stamford Bridge; *H. nemoralis* v. *olivacea* 00000 and 00300 (the band being the faintest trace) from the gamekeeper's cottage on Buttercrambe Moor; *Hyalinia nitidula* and *H. crystallina* on pieces of stick in Buttercrambe Moor Wood; *Zonitoides nitidus* common on the bottom of a dried-up pond at Strensall; and *Limnæa peregra* from Strensall pond.

Mr. Smith also noted that he had not particularly worked the ponds on Buttercrambe Moor except near the sides, where he has taken *Limnæa glabra* and small *Bythinia tentaculata*. *L. peregra* swarms in these ditches and *Succinea putris* is plentiful on the Great Water Plantain. *Valvata cristata* and *Limnæa truncatula* are very common.

On the roadsides about Stamford Bridge he has found *Helix nemoralis*, *H. hortensis*, *H. aspersa*, *Helicella cantiana*, *Hygromia rufescens*, *H. hispida*, *Pyramidula rotundata*, *Vallonia pulchella*, *Ena obscura*, *Vitrina pellucida*, *Clausilia bidentata*, *Cochlicopa lubrica*, *Carychium minimum*, etc.

(To be continued).

—: o :—

Mr. W. G. Fearnside, of Cambridge, has been appointed to the Sorby Chair of Geology, Sheffield.

Mr. P. F. Kendall junior, Assistant Curator of the Zoological Museum of the University of Sheffield, has been appointed Lecturer in Zoology and Geology to the South-Eastern Agricultural College at Wye.

We regret to record the death of Dr. P. L. Sclater, F.R.S., at the age of 84. He was elected secretary to the Zoological Society in 1859 and held the post till 1902. His zoological work was well-known, and he was one of the pioneers of the modern science of geographical distribution.

NOTES ON THE BLUE-GREEN ALGÆ, WITH A KEY TO THE SPECIES OF OSCILLA- TORIA AND PHORMIDIUM.

HAROLD WAGER, F.R.S.

THE Blue-green Algæ (Cyanophyceæ, Myxophyceæ or Schizophyceæ) form a group of plants which resemble the green Algæ in some respects, but are sharply differentiated from them in the structure of the cell. They are characterized by the presence of a bluish purple colouring matter called *phycocyanin* which is contained in the cells in addition to the ordinary chlorophyll. This colouring matter is soluble in water, and can be easily extracted by allowing the plants to stand in water for some time, or better, by placing them in water to which a few drops of chloroform have been added. The constitution of the colouring matter is unknown. The plants vary in colour from a bright blue-green to reddish purple, violet, dark green, or even black, according to the amount of phycocyanin present. The darker colouring is found mainly in plants growing in a shady situation, the lighter colours, as a rule, in those growing more in the light. It has been found possible to vary the intensity of the colour by growing a given species under different light conditions and under various light filters.

The cell structure of these plants is much simpler than that of the green algæ and other plants. In most cases two distinct regions can be recognized in the protoplasm, a central clear region commonly known as the *central body* and a peripheral region in which the colouring matters are contained. Both show a reticulate or vesicular structure and both contain deeply stainable granules. The staining reactions of the central body show that it possesses some of the characteristics of a nucleus, but its structure is much simpler than the nucleus of the higher plants. The peripheral area gives the staining reaction of cytoplasm. Among the granules present three distinct kinds can be recognized. In the central body chromatin granules, recognized by their reaction to nuclear stains and by the fact that they are found to contain phosphorus, are found, together with bright refringent granules easily seen in the living cell, which stain a reddish blue in a solution of methylene blue and which are known as metachromatin granules. In the peripheral area, and especially on the transverse walls, there are bright refringent granules, visible in the living cell, and easily differentiated by the bright red colour which they take in a solution of carmine. These are *cyanophycin* granules. The function of the metachromatin and cyano-

phycin granules is unknown, but they are probably composed of some kind of reserve substance which is produced as a result of the cell activities. The cyanophycin granules frequently occur in a double row, one on each side of the transverse walls in the filamentous form of the blue-green algæ, and are especially characteristic of certain species.

The chlorophyll is contained in the peripheral layer of the cell protoplasm, never in the central body, but the outline of this body is frequently irregular, and the peripheral chlorophyll layer in contact with it takes the same irregular outline. The peripheral layer is sometimes regarded as a chromatophore, but the evidence for this is not satisfactory, and my own observations do not support this view. The chlorophyll appears to be lodged in the meshes of the network or foamlike structure of the cytoplasm and frequently presents the appearance of minute granules. This may, however, be an optical illusion caused by the small size of the cytoplasmic meshes, the different layers of which, some being in focus and others not, when seen one behind the other, may present a granular appearance similar to what is observed in a very fine oil emulsion.

The cell contents are sometimes vacuolate, but not usually so, in healthy trichomes. It is only when the cells are old and in various stages of decay, and in certain floating forms, that vacuoles appear.

The protoplasm is in all cases surrounded by a cell membrane. This can be made distinctly visible by placing the plants in a chemical reagent, such as a 30 per cent. solution of chromic acid, which dissolves or destroys the protoplasm. The membrane does not give the reaction for cellulose, but is coloured strongly by various aniline dyes, and is probably related to cutin. A mucilaginous layer is frequently present outside the cell wall.

In the filamentous forms the mucilaginous layer forms a sheath which is usually firm and leathery in *Lyngbya*, usually diffuent or mucous-like in *Phormidium* and some other forms. It differs in its chemical reactions from the cell wall surrounding the protoplast, being composed of a substance similar to cellulose. It is largely soluble in chromic acid and in strong sulphuric acid. The sheath can be rendered visible by staining in safranin and in iodine reagents, such as chlor-zinc-iodide, in which it often takes a blue colour. In the classification of the blue-green algæ the sheath is used for the primary separation into families.

I have found glycogen in the cells of all the blue-green algæ which I have examined, including species from all the families and from a considerable number of genera, *Nostoc*, *Scytonema*, *Oscillatoria*, *Lyngbya*, *Phormidium*, *Gleocapsa*,

Tolypothrix, etc. It occurs usually in the peripheral layers of the cell, but is sometimes also encountered in the central body. The glycogen takes the place of starch, and appears to be a product of photosynthesis. It is not found in the absence of light or carbon dioxide, and the amount present varies when the plants are grown under different coloured light-filters, being greatest under orange and red, much less under blue-violet, and still less under green-coloured filters.

Cell division takes place by the formation of a new cell wall across the middle of the cell. This begins first of all by the formation, on the lateral wall, of a peripheral ring, which gradually grows inwards. The cell then increases in length, and both central body and peripheral cytoplasm become elongated. As the new cell wall grows it gradually brings about a constriction of the cytoplasm and central body, until they are finally completely divided into two parts. A continuity of protoplasm has been observed in some forms from cell to cell, as in higher plants, so that the protoplasts of a trichome are all connected with one another. In some cases I have observed that prolongations of the central bodies themselves are continued from one cell to another, and in *Cylindrospermum* a single deeply-staining strand extends through the cell wall from one cell to the next. In many cases cell division goes on so rapidly that the daughter cells begin to divide before they are fully separated, and in some cases a second and even a third division begins before the first cell wall is completed. I have observed in one cell as many as seven new cell walls in various stages of development.

Reproduction takes place in the unicellular forms by simple division, or by the formation of spores. In the filamentous forms reproduction takes place by means of portions of the trichome, consisting of one or more cells which become separated from the rest and ultimately develop into new trichomes or filaments. Sexual methods of reproduction have, so far, not been discovered in any members of the group.

CLASSIFICATION.

The Blue-green Algæ are primarily divided into two orders, (1) the Coccogoneæ, consisting mainly of unicellular plants, either free or surrounded by a layer of mucilage derived from the cell-wall, and sometimes forming groups or colonies of cells in a common mucilaginous matrix, to which such forms as *Gleocapsa*, *Chroococcus*, *Glocothece*, etc., belong, and (2) the Hormogoneæ, to which the filamentous forms *Oscillatoria*, *Phormidium*, *Lyngbya*, *Nostoc*, etc., belong.

Some of the filamentous forms are surrounded by a mucilaginous sheath, which is more or less distinctly visible under natural conditions; in others the sheath is absent.

There are six well-marked families in the Hormogoneæ, (1) Oscillatoriaceæ, (2) Nostocaceæ, (3) Scytonemaceæ, (4) Stigonemaceæ, (5) Rivulariaceæ, (6) Camptotrichaceæ, and two in the Coccogoneæ.

The Oscillatoriaceæ contain a large number of species very widely distributed and frequently met with, belonging especially to the genera *Oscillatoria*, *Phormidium*, and *Lyngbya*. The primary distinctive characteristic of these three genera is the presence or absence of a gelatinous sheath. In *Oscillatoria* the sheath is absent; in the other two genera it is present, well-marked in *Lyngbya*, but usually not so well marked in *Phormidium*. Many species of this genus have a sheath which is so thin and transparent or diffuent that it is not easily made out without staining reagents, and it is extremely difficult, therefore, to differentiate them from species of *Oscillatoria* which they much resemble in other respects. In order to obviate this difficulty to some extent, and to allow of a more rapid preliminary diagnosis, I have for many years made use of a key for the species of these two genera, which is drawn up in a purely artificial manner, and is based mainly upon the structure of the trichome as given in Gomont's monograph*. The sheath is only used as a distinguishing feature when there can be no doubt of its visibility under the microscope. As I have found this key extremely useful, I have now made it more complete by the addition of references from De Toni's 'Sylloge Algarum'† and from Josephine Tilden's monograph‡ on the Myxophyceæ of North America, and venture to publish it, together with the more important characteristics of each species as given by Gomont and Tilden, in the hope that it may be useful to others. For a general account of the various families and genera of the Myxophyceæ the reader should consult Professor G. S. West's treatise on British Freshwater Algæ.§ References to some of the Yorkshire species will be found in 'The Algæ-Flora of Yorkshire,' by W. and G. S. West, published by the Yorkshire Naturalists' Union in 1901.||

(To be continued).

* Gomont, 'Monographie des Oscillariees.' Ann. des Sci. Nat. Bot., 1893.

† J. B. De Toni, 'Sylloge Algarum,' Vol. 5 ('Sylloge Myxophycearum Omnium Hucusque Cognitarum,' by Achilles Forti, 1907).

‡ Josephine Tilden, 'Minnesota Algæ' (Vol. 1, 'The Myxophyceæ of North America and Adjacent Regions, including Central America, Greenland, Bermuda, the West Indies, and Hawaii.' Report of the Survey, Botanical Series VIII., Minneapolis, 1910).

§ G. S. West, 'A Treatise on the British Freshwater Algæ.' Cambridge University Press, 1904.

|| Botanical Transactions of the Yorkshire Naturalists' Union, Vol. 5. Leeds, 1901.

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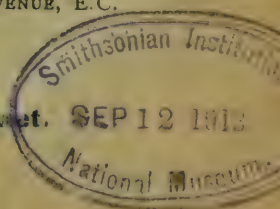
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NOTES AND COMMENTS.

Q. J. G. S.

The June number of the Quarterly Journal of the Geological Society, which was 'issued on July 29th,' and reached us early in August, gives evidence of the geological work being accomplished in the North of England. The first paper is by Mr. S. S. Buckman, on the 'Kelloway Rock,' of Scarborough (though we think he should have used the proper word 'Kellaways') and he records 60 species of ammonites from that rock. Mr. C. Thompson follows with his enormous list of the Derived Cephalopoda of the Holderness Drift, and remarks thereon; he records several new forms of ammonites. Mr. C. T. Trechmann follows with a description of the remarkable mass of Anhydrite in the Magnesian Limestone at Hartlepool, which has already been referred to in these pages. Mr. H. H. Thomas gives an account of the fossil flora of the Cleveland district, dealing with the Marske Quarry, and his paper is remarkably well illustrated. The Rev. G. J. Lane supplements this paper with Stratigraphical Notes.

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ENTOMOLOGICAL RECORDS.

In *The Entomologist's Monthly Magazine* for August Mr. D. Sharp corrects an error which was corrected on the proof but which was not corrected. 'It is stated that Paykull gives no reason for substituting the name *practicorne* for that of the previous *globerrimum*. He does, however, give a reason by saying that when examined with a lens the insect is not *globerrimum*.' We quite agree with Dr. Sharp that 'the confusion is very great,' and we hope the matter is simplified by his suggestion that the long-winged form be called *globerrimum* and our common form *brevipenne*.

PRESENT KNOWLEDGE OF PROTURA.

In a paper on 'The Present Knowledge of the Protura' in *The Entomologist* for August, Mr. C. B. Williams states that

'the antennæ are completely absent in all known forms, Schepotieff's account of the antennæ of *Protapteron indicum* having been shown by Rimsky-Korsakow to have been an error. Rimsky-Korsakow also states that Schepotieff was mistaken in his account of the mouth parts, etc., and that his genus *Protapteron indicum* is a quite typical member of the genus *Eosentomon*.' Also 'Silvestri first described them as an order Protura of the subclass Apterygota of the Insecta. Berlese . . . removed them from the Insecta and treated them as an order Myrientomata of the class Myriapoda. Schepotieff united them with Campodea as a suborder Prothysanura of the Thysanura. Börner makes them an order of the Apterygota. Rimsky-Korsakow . . . proposes to consider them as a class Myrientomata, between the Myriapoda and the Insecta.' Prell gives an elaborate classification, and so on. Heaven only knows where the Protura now are !

A FOLK MUSEUM FOR ENGLAND.

One of the greatest needs in this country is the establishment of a National Folk Museum, and the fact that the Crystal Palace is now available for some public purpose enables the matter to be discussed in the current number of *Knowledge*. Of all the survivals from former times, none surpass in interest the people's homes. The first duty, therefore, of the open-air museum would be to secure ancient houses bearing in a sufficiently well-marked manner features distinctive of some period or locality. The buildings would be taken down and re-erected in the grounds with scrupulous regard to their original form. It is not contemplated, it need hardly be said, to ransack the English countryside and tear buildings from their time-honoured sites, where there is no danger of their demolition or serious mutilation, but to rescue here and there worthy and typical buildings in imminent danger of destruction. After their re-erection the houses would be provided with contemporary furniture and all appropriate appliances, the idea being to show them exactly as they appeared to the people of the time. Some of the houses might have associated with them old English gardens, with a columbarium, a well-house, a sundial, and clipped yews.

OPEN-AIR MUSEUMS.

Besides domestic buildings, other structures would be treated in the same way, such as ancient barns and water-mills. It might even be possible to save some abandoned and decaying English church, whose preservation is demanded by its age or importance. Such a church would form the most appropriate home for the display of ecclesiastical art. The scheme provides for the assignment of a portion of the grounds for our great national games and pastimes. Here would be a

maypole for the children and a bowling green for their elders. A dancing floor would be laid out for national dances, and an open-air theatre prepared for the performance of historical pageants and stage plays.

THE CRYSTAL PALACE

As to the Crystal Palace itself, it would serve for the exhibition of objects of all sorts illustrating the daily life, occupations, and amusements of the peoples of these islands. One room could be devoted to children's toys, another to objects used by women in indoor amusements, another to the apparatus and methods of producing fire in past times, another to inventions, another to models to enable the blind to gain, by tactual means, a knowledge of some of the more interesting objects in the various departments.

THE AGE OF THE EARTH.

Mr. E. Jobling, in *Knowledge* for August, gives reasons why Lord Kelvin's estimates of the age of the earth have been shown to be too small, and he considers the evidence to be derived from the examination of the time it must have taken to carve out the continents, to lay down the various strata, to evolve living plants and animals, and also considers the matter under the heading of Radio-activity. He states that from all points of view it must be conceded that a period of one hundred million years is a reasonable estimate of the age of the Earth. It cannot be expected, however, that finality is attained, nor do we admit that Mr. Jobling has advanced the discussion very much. His estimate, like its predecessors, may have to be discarded if further investigation requires it. It is suggested that the best attitude is to regard the one hundred million years as the earth's *minimum* age; and, if occasion demands, to consider impartially an estimate of greater—it may be much greater—magnitude.

PUBLIC UTILITY OF MUSEUMS.

Lord Sudeley, who has taken such a keen interest in the popularization of our museums and galleries, has favoured us with a copy of the second edition of his pamphlet with the above title. In Parliament recently Lord Sudeley 'rose to move for an annual return to the 31st December in each year from all public museums, including the Tower of London, picture galleries and botanic gardens, in or near London, and in Edinburgh and in Dublin, and to ask His Majesty's Government whether as it has been found difficult to obtain at present a Return from provincial Institutions, the Board of Education will undertake to call the attention of the local authorities to the desirability of enabling the public to obtain information by means of "guide demonstrators," as far as possible, in all the principal local museums, galleries, and gardens throughout

the United Kingdom, to request particulars as to what is being done in the direction indicated, and to ask if the above information may be embodied in the Return.' Apparently there were difficulties with regard to the provincial institutions, but, with slight alterations, the motion was agreed to and ordered accordingly. Personally, we feel strongly that there is much educational work to be accomplished on the lines suggested by Lord Sudeley, and the public would gladly avail themselves of such guidance. The difficulty, however, is likely to be due to the fact that most provincial institutions at present are short of funds, and understaffed.

CLASSIFICATION OF IGNEOUS ROCKS.

In addition to its *Annual Report and List of Members*, the *Birmingham Natural History and Philosophical Society* has issued two separate papers, viz., 'Classification of Igneous Rocks,' by Dr. H. Warth, and 'Introduction to the Fauna of the Midland Plateau,' by Mr. P. E. Martineau. In his paper Dr. Warth refers to his previous suggestions of a chemical classification which were founded upon the ordinary chemical composition of the rocks and not on moleculars. The latter would have afforded little advantage as long as he partitioned by individual bases only. 'In the following method I have, however, based the partition not upon individual bases but upon the respective sums of bases of equal valency, and in this case molecular percentage is required and yields superior results. . . . One thousand rocks were selected from current literature and their molecular percentages calculated in the usual manner. A dichotomous division was then carried out,' etc. Diagrams and tables innumerable follow, to which we must refer our readers who may be interested.

EVOLUTION OF THE ARROW.

The *Journal of the East Africa and Uganda Natural History Society*,* besides containing many interesting notes and illustrations bearing upon the larger mammalia, etc., of the districts covered by the title of the publication, contains an interesting paper on 'The Evolution of the Arrow,' by Mr. C. W. Hobley. By a series of illustrations the author shows the development of the arrow point from a mere stone splinter, through various stages, to the fully-barbed stone arrow-point. He then refers to the arrow-head mimetic of *Acacia* thorn, through various stages, to the 'Monbuttu arrows with extravagant barbing.' Then follows an arrow-head of iron, obviously a copy of a stone arrow-point, and so on. Similarly, the evolution of the 'feathering' is shown from a leaf, and piece of leather, to the most elaborate system of feathering. 'The most highly-

* Vol. III., No. 6, July 1913. 72 pp. Longmans, Green & Co., 5s. 4d.

developed arrows in British East Africa are those of the A-Kamba, and the finish and balance of a good example is equal to anything that could be turned out in Europe. Most of the hunting tribes mark the detachable heads of their poisoned arrows to enable a hunter to establish a claim to his quarry. The wooden portion generally contains the clan-mark, and the iron point the personal mark, of the owner.'

THE MINERALOGICAL MAGAZINE.*

No. 77 of this publication contains notes on Varieties of Zirkelite from Ceylon, by Messrs. G. F. Blake and G. F. H. Smith. Dr. Smith also describes an apparatus for preparing thin sections of rocks in use at the British Museum, and also 'The Graphical Determination of Angles and Indices in Zones.' Mr. W. C. Smith gives an account of the Mineral Collection of Thomas Pennant, recently presented to the British Museum. Professor W. J. Lewis describes Ilmenite from the dolomite at Binn, Switzerland, and there is a paper by the late R. F. Gwinnell on Calcite crystals from a water tank near Grantham, Lincs. Mr. H. Collingridge gives a Note on the determination of the optic axial angle of a crystal in thin-section by the Mallard-Becke method.' and Mr. L. J. Spencer contributes a (sixth) list of new mineral names, which is a long one, and contains many which seem mystic, weird, and wonderful.

FORAMINIFERA.

In No. 72 of the *Journal of the Quekett Microscopical Club*, Messrs. E. Heron-Allen and A. Earland have a lengthy paper on 'The Foraminifera in their Rôle as World-builders: a Review of the Foraminiferous Limestones and other Rocks of the Eastern and Western Hemispheres.' They point out that 'of extremely simple structure, mere protoplasm without differentiation other than the nucleus, they yet possess the power either of secreting a solid shell from the mineral salts absorbed from their surrounding medium, or of building up adventitious shells by the co-ordination of foreign material obtained from their immediate environment. These shells, from their minute size and composition, are peculiarly adapted for preservation as fossils.

THE ORIGIN OF LIFE.

Hence, whatever the origin of life may have been, we might reasonably expect that among its earliest records would occur Foraminifera of simple and ancestral types, and that subsequent geological periods would show a constant progression in their development. Such, however, is not the case. So far as our geological knowledge carries us at present, the Foraminifera make their first appearance in the rocks in

* London, Simpkin, Marshall & Co., 1913, pp. 309-394, price 5s.

a highly differentiated stage, and among the earliest recognizable groups are many species which are still existing and dominant types to-day.

EOZOOON CANADENSE.

It is not so very many years—less than half a century, in fact—since the sensational discovery of *Eozoon canadense* in the Laurentian rocks of Canada was hailed as evidence that the oldest fossil, was, as might have been expected, a rhizopod. Into the long warfare which was waged around this fossil, it is not proposed to enter in detail. But there was at the time of its discovery no greater authority on the Rhizopoda than the late Dr. W. B. Carpenter. He threw the whole weight of his authority into the scale in favour of the foraminiferal nature of *Eozoon*, and to the last was convinced of the soundness of his belief. But the balance of evidence has turned against him, and since his death but little interest has been shown in the question, *Eozoon* having been relegated by more or less general consent to the mineral kingdom. We are, however, again threatened with a renewal of the controversy, for Mr. R. Kirkpatrick, of the British Museum, has recently announced in *Nature* that he is in possession of fresh evidence of the foraminiferal nature of *Eozoon*, and will shortly publish it. The microscopical world will no doubt await this evidence with interest.

THE SELBY MUSEUM.

We learn from the Press that 'The Selby Educational Museum, which the late Sir Jonathan Hutchinson has left to his trustees to dispose of in their absolute discretion, has been generously offered to the town of Selby. The Urban District Council have the matter under consideration, and a decision will doubtless be arrived at at a special meeting. The Museum buildings include a large Museum Hall, which is used for public meetings. The property was leased from Lord Londesborough, and the term under the lease has yet to run some twenty-seven years. Inquiry is now being made as to the terms upon which the lease can be renewed or the property purchased. The property would without doubt be an acquisition to the town. The project is being mooted to move the Art School from its present inadequate premises in New Lane and provide for it in the Museum buildings, where there would be sufficient room. A more spacious Council Chamber for the Urban Council meetings is needed, and this could also be provided at the Museum buildings with the carrying out of slight alterations.' From this it would seem that it is not altogether a Museum that the people of Selby want. At present we know the Museum is useful for political meetings and domino competitions, but it should rise above that.

ABNORMAL FLOWERS OF THE FOXGLOVE.

ETHEL M. POULTON, M.Sc.,
Technical College, Huddersfield.

The common Foxglove (*Digitalis purpurea* L.) has a decided tendency to exhibit abnormal forms, and a number of sports have from time to time been described. Mr. E. Snelgrove, in an article on "Peloria in Plants" (*The Naturalist*, 1909, page 132) mentions and figures a case of peloria in the Fox-



Fig. 1.—Inflorescence of Foxglove with abnormal flowers.

glove, and Miss Saunders, in "The New Phytologist" (Vol. X., page 47), describes a mutation of the Foxglove in which the stamens appeared to replace some or all of the petals. In both papers references will be found to other occurrences of abnormal Foxglove flowers. The specimen now described was found early in July near Dob Park Bridge, about three miles from Otley, by a scholar of the North Parade Council School, Otley. It was sent to Dr. T. W. Woodhead for examination, and at his suggestion I made a detailed study of the flowers, which show several points of interest.

The accompanying illustration (Fig. I) is taken from a photograph of the inflorescence, from which it will be seen that all the flowers differ greatly in appearance from the typical Foxglove. The first striking feature is the corolla with its spreading ribbon-like segments, which in the mature flower curl backwards. The splitting of the corolla into segments causes the flower to appear very open and exposed, many of the stamens

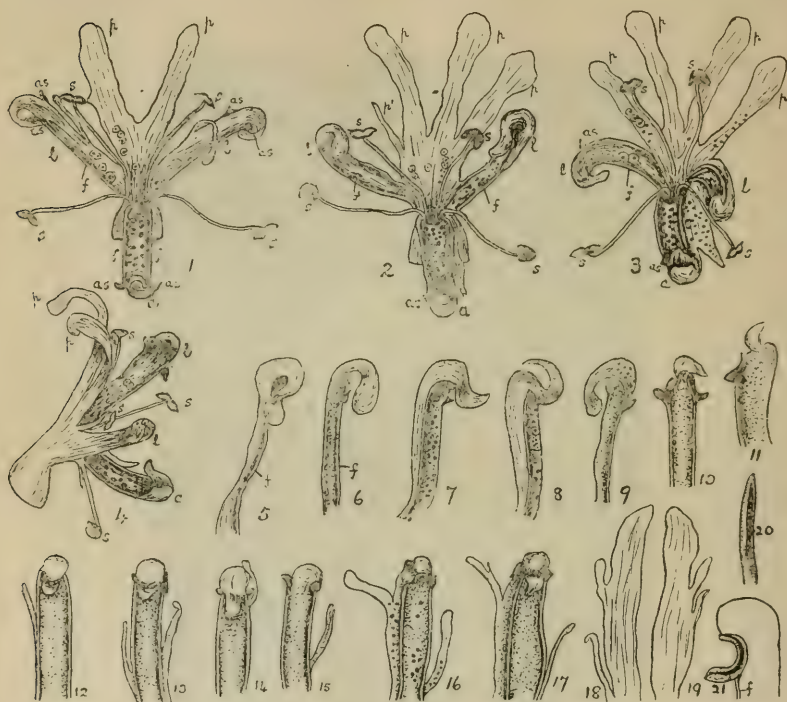


Fig. II.—Abnormal flowers of Foxglove; for details see text.

projecting from between the corolla lobes. This is in striking contrast to the ordinary flower, in which the stamens are completely hidden by the slightly-lobed corolla. The individual flowers exhibited a very interesting structure. In every instance the calyx, with its small posterior sepal, and the gynæcium were in exact agreement with the type. The departures from the normal concern only the corolla and the andrœcium, and are illustrated in Fig. II., 1-21. The corolla consisted of a varying number of lobes, all joined at the base to form a tube, constricted towards its lower end as in the ordinary Foxglove (Fig. II., 4). In the majority of flowers the

posterior region of the corolla consisted of two lobes, the incision between them being shallower than those between the remaining lobes (Fig. II., 1 *p, p*). The posterior lobes sometimes exhibited a faint spotting. An anterior lobe (*a*) and a pair of lateral lobes (*ll*) were always present, but in some instances the number of segments was greater. In Fig. II. 2, three large posterior lobes and a fourth smaller one (*p'*) are represented, and the anterior lobe is also subdivided. Four large posterior lobes are shown in Fig. II., 3, also an additional anterior lobe. Small additional lobes are less common on the posterior than upon the anterior and lateral corolla segments. Fig. II., 12-17 show such lobes on the anterior and lateral petals, and Fig. II., 18 and 19, represent two posterior lobes from the same flower, each having two small subdivisions. Some of these small lobes had their extreme edges curled inwards (Fig. II., 20), and their tips were often found to be covered with pollen grains. These were at first thought to be rudimentary stamens, but after allowing the material to remain in alcohol for a week or two, many of the adhering pollen grains were dislodged, and it was found that the small lobes exhibited the ordinary petal structure right to their tips. Before the flower is fully opened the petals are curled inwards, and are often in contact with the anthers, so that it is probable that different parts of the corolla become accidentally dusted with pollen. Groups of pollen grains were found adhering to various parts of the corolla, but at the extreme tips they are more securely entangled by the small hairs which occur there. If these small lobes were rudimentary anthers it would seem reasonable to expect to find stages of development intermediate between these and the ones which are described below. Such intermediate stages were not observed. Again, would such rudimentary anthers produce normal pollen grains, as those which were found adhering to the tips appeared to be quite normal? It seems clear that these small structures are merely lobes of the corolla and exhibit no trace of anther structure.

The androecium exhibited a very interesting modification. In every flower examined the four well-developed stamens characteristic of the Foxglove were present. These were readily distinguished by their position and structure. They occur in the usual position, alternating with the corolla lobes as shown in Fig. II., 1, 2, and 3s. There was no trace of a posterior stamen. The filaments were long, attached to the corolla tube near the region where it becomes constricted, and carried the anthers far outside the flower (Fig. II. 1-4). The anthers were yellow, and faintly spotted. Dehiscence takes place in the usual manner.

In every flower additional stamens occurred, a pair of which was attached to the anterior and to the lateral lobes of

the corolla respectively, making six additional stamens in the flower (Fig. II., 1, 2, and 3 *as*). They always occupied the same position, and were easily distinguished from the normal stamens. The filaments were wholly joined to the corolla so that they had the appearance of white ridges (Fig. II. 5 and 6 *f*). The anthers, which were similar in colour to the normal ones, appeared to be partially adnate to the corolla, one half being free (Fig. II., 21). Dehiscence takes place in the ordinary manner by means of a slit which extends the entire length of the anther. The pollen grains produced by these stamens resembled the normal grains in size and structure.

Before the flowers are mature the tips of the corolla lobes to which the additional stamens are attached are bent inwards, almost completely covering the anthers (Fig. II., 5). Later the tips curl backwards until finally the anthers are fully exposed. Fig. II., 5-9, show the successive stages.

It is a noteworthy fact that the additional stamens were constant in number and position, and that no traces of such stamens were found in the posterior region of the flower. It would appear that the tendency to the suppression of stamens in this region is very deep-seated.

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As Supplement No. 10 to *The Journal of the Board of Agriculture* is a 'Further Report on the Isle of Wight Bee Disease.'

In *British Birds* for August, Mr. Ford-Lindsay records three gull-billed terns, which were duly shot, and 'none have been seen since in the locality.'

Notes on the alleged occurrence of the Wild Cat in Ireland, from the pens of Messrs. Harvie-Brown and R. F. Scharff, appear in *The Irish Naturalist* for July.

Enquiry is being made in the *Geological Magazine* for the present whereabouts of a collection of fossil plants made by Edward Mammatt, author of *Geological Facts*.

A lengthy account of 'The Geology of the Nottingham District,' by Mr. Bernard Smith, appears in the *Proceedings of the Geological Association*, Vol. XXIV., Part 4.

In the *Lancashire Naturalist* for July, Mr. R. Standen records *Armadillidium pictum* Brandt. in Westmorland. This woodlouse does not appear to have been previously recorded in the British Isles.

Mr. Hugh Richardson contributes a very interesting note on '*Aquilegia vulgaris* dominant' to *The New Phytologist* for July, and in the same journal Mr. W. T. Saxton gives a classification of the Conifers.

The July number of *The Geological Magazine* commences the fiftieth year of the existence of that useful journal, and during the whole of that time it has been under the editorship of Dr. Henry Woodward. We should like to congratulate the editor upon so unique and worthy a record.

From *The New Phytologist* for July we learn that 'Since *Ænothera Lamarckiana* Seringe becomes a synonym of *O. grandiflora* Solander, I have proposed that the plant of De Vries retain the name under which it is known . . . but the name must be written *Ænothera Lamarckiana* De Vries.'

YORKSHIRE NATURALISTS AT STAMFORD BRIDGE.

(Continued from page 304).

COLEOPTERA.—Dr. W. J. Fordham writes :—The following beetles were found by the side of the river Derwent between Stamford Bridge and Buttercrambe Bridge, in the East Riding, mainly by sweeping (or in the river in the case of water beetles).

<i>Nebria brevicollis</i> F.	<i>Tachyporus obtusus</i> L.
<i>Loricera pilicornis</i> F.	<i>Dolopius marginatus</i> L.
<i>Pterostichus niger</i> Schal.	<i>Cyphon coarctatus</i> Pk.
<i>Bembidium littorale</i> Ol.	" <i>variabilis</i> Thun.
" <i>flammulatum</i> Clair.	<i>Telephorus bicolor</i> F.
<i>Haliplus ruficollis</i> De G.	<i>Rhagonycha limbata</i> Th.
<i>Hydroporus palustris</i> L.	<i>Malthodes dispar</i> Germ.
<i>Deronectes depressus</i> F.	<i>Prasocuris phellandrii</i> L.
<i>Platambus maculatus</i> L.	<i>Phyllotreta undulata</i> Kuts.
<i>Ilybius fuliginosus</i> F.	<i>Crepidodera ferruginea</i> Scop.
<i>Helophorus brevipalpis</i> Bed.	<i>Anaspis maculata</i> Fourc. (On
<i>Cercyon melanocephalus</i> L.	Conium).
<i>Stenus pallitarsis</i> Steph.	<i>Apion apricans</i> Hbst.
" <i>nitidiusculus</i> Steph.	" <i>humile</i> Germ.
" <i>tarsalis</i> Ljun.	<i>Cionus scrophulariæ</i> L. (Larvæ
<i>Anthobium torquatum</i> Marsh. A	abundant on Figwort).
very dark specimen.	<i>Ceuthorhynchideus floralis</i> Pk.
<i>Anthobium sorbi</i> Gyll.	

At Aldby Park, in the North Riding, were found *Harpalus latus* L. and *Harpalus brevicollis* Dej.

In Buttercrambe Woods (North Riding) were :—

<i>Carabus catenulatus</i> Scop. Under logs.	<i>Dermestes murinus</i> L. On a Keeper's pole.
<i>Leistus ferrugineus</i> L. Under logs.	<i>Phyllobrotica quadrimaculata</i> L. and
<i>Nitidula bipustulata</i> L. On a Keeper's pole.	<i>Galerucella sagittariæ</i> , Gyll. By sweeping.

The only species calling for special mention are, *Harpalus* (*Ophonus*) *brevicollis* Dj. which has been previously confounded with *Harpalus rufibarbis* F. Dr. Sharp, in Ent. Mon. Mag., xlviii., 183, gives the characters of these species and states that *brevicollis* Dej. is the more abundant. I have taken both species at Bubwith, East Yorks.

Stenus pallitarsis Steph. very local in Yorks. (previous records, Askham Bog and Hornsea Mere).

Dermestes murinus L. a local species recorded from York, Hull, Doncaster, and Bubwith.

Malthodes dispar Germ. very local, previously found at Acomb, Saltaire and Bubwith.

Phyllobrotica quadrimaculata L. very local (only previous Yorks. record, Raincliff Bog). One specimen only was taken by sweeping a marshy place in a wood where the food plant, Skullcap, was abundant.

Galerucella sagittariæ Gyll. very local and only recorded from Askham Bog.

My thanks are due to Mr. W. E. Sharp, F.E.S., for kindly verifying several of the above species.

GEOLOGY.—Mr. J. W. Stather, F.G.S., writes:—To anyone at all interested in glacial geology, the neighbourhood of Stamford Bridge is well worth a visit—for in this part of the Vale of York, the solid rocks are entirely hidden by huge masses of morainic material, left there by the glaciers of the Great Ice Age.

The route chosen by the geologists was in the direction of High Catton, and the morainic character of the country traversed was quickly evident, both from the stones and boulders scattered on the fields and round about the farmsteads, and from the general features of the landscape.

At High Catton the moraine is particularly well defined and has been quarried extensively in several places. In one of the pits a newly exposed section was seen, showing an exceedingly varied series of current-bedded sand and gravel. There was also, in the quarry, large heaps of recently excavated material consisting of well-rounded gravel and stones with here and there a large boulder.

This was carefully examined and found to consist almost entirely of sandstones and limestones from Carboniferous sources. Not a single specimen of a local or a secondary rock was seen in this pit, but several specimens of Shap Granite and other far travelled igneous rocks were noted. Brockram from the Vale of Eden was also not uncommon.

On the other hand, near High Catton Grange (one mile North-East of the above quarry) a small pit was examined, which, in addition to Carboniferous rocks, contained flints and pebbles of chalk, in abundance.

Heartly thanks are due to Mr. Beedham, of Stamford Bridge, for help rendered the geologists in finding the sections, and for placing his horse and trap at their disposal.

W.E.L.W.

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Mr. E. L. Hummel has been appointed Professor of Mining at the Leeds University.

Professor C. J. Patten has been elected President of the Sheffield Naturalist's Field Club.

Mr. W. R. Crawford has been appointed 'live stock officer' for Yorkshire by the Board of Agriculture.

Much unnecessary type seems to have been used in a contemporary in reprinting unimportant letters by the late Thomas Gough.

Professor W. S. Boulton has been appointed Professor of Geology at Birmingham, in the place of Professor Lapworth, who is retiring.

FIELD NOTES.

BIRDS.

Three House Martins Building one Nest.—During the last week in May (which is late for a first nest, and rather early for a second one), some House Martins commenced 'claying' along a line under the eaves of an unfinished building immediately opposite my house, and after making more than a yard of it, in almost a straight line, commenced building up the nest. I noticed that there were three birds, and expected that more than one nest was being built. The three birds were about the nest until incubation commenced, when I could only see two of them, and several evenings, at dusk, I flushed two birds only off the nest. I expected that the third bird would put in an appearance again during the period of feeding the young, but although I watched very carefully I could not account for more than two adult birds.—H. B. BOOTH, Ben Rhydding.

Strangers at the Farnes.—On July 20th, while in a photographic tent on The Knoxes, I had under observation two large gulls quite unknown to me. They were on the water between The Knoxes and The Farn, swimming about and examining the seaweed for more than half-an-hour.

They seemed to be quite as large as the Greater Black Backed. The beak appeared to be dull red or perhaps brown; the throat breast and what was visible of the under parts were white; the mantle and wing coverts were Herring-Gull grey or perhaps a little darker. On the head was a black cap with a well defined edge, and intermixed with the black were a number of whitish feathers, and with a more definite white mark running diagonally beneath the eye, in each bird.

The beak colouration does not agree, but I can find no gull of an equal size and with a black cap which so nearly fits this description as the Great Black Headed Gull, which so far as I can discover has only been recorded in Britain on one occasion, when an adult specimen was shot at Exmouth in 1859. The birds rode lightly on the water, and held their heads very erect; the feet were not seen.

It was unfortunate that, while I was endeavouring to attract Mr. Fortune's attention, Darling, the watcher, happened to row by, and put up the birds without noticing them. Can anyone name them?—JASPER ATKINSON.

Decrease in the Number of Starlings.—During the last twenty years or more I have paid much attention to the Starlings of mid-Airedale—with Shipley as a centre—and mid-Wharfedale—with Ben Rhydding as a centre. The Starling is a most interesting bird to watch. I have never yet been able to satisfy myself of a second brood in one season, although I have heard of second, third and even fourth broods in one season. I believe that the Starlings of this neighbour-

hood are very stationary, and that we have very few (if any) emigrants or immigrants—unless it be that part of the young birds of the year leave us.

During the past twenty years, each year has continuously brought in reports of the increase of Starlings, and complaints of their occupying and driving out other species (such as Woodpeckers, Tits, Robins, Redstarts, and even Pied Flycatchers) from their nesting holes, and that in addition to eating other fruits than cherries, it has seriously attacked apples, pears, grain, etc. In fact it has become a nuisance almost as much as formerly it was beneficial in destroying wire-worms, leather-jackets and various other grubs. In early May many old nesting holes of Starlings were unoccupied this season, and that for the first time I noted a decrease in the number of local nesting Starlings. Many friends in the district have also noted a decrease in the number of Starlings during 1913.

Towards the end of July and early August the birds were in flocks of six to a dozen, instead of in scores, or in hundreds, as in former years. Apparently the fruit crops had not been attacked to the same extent this season.

It would be interesting to learn if the same holds good in other districts.—H. B. BOOTH, Ben Rhydding.

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FISHES.

The Ribbon Fish.—We learn from *Nature* that a specimen of the rare deep-sea ribbon-fish, *Trachipterus arcticus*, which was landed at the Grimsby market recently, has been sent to the University College, Reading. 'The following details of the specimen are perhaps worth reporting:—Length, 5 feet 8 inches; greatest width, $10\frac{3}{4}$ inches. No anal or pelvic fins. Caudal fin not axial, and the ventral portion without fin rays. Base of pectoral fin horizontal. Dorsal fin with 154 smooth rays. Teeth small but sharp. Skin silvery, and spinous on the ventral edge of body and along lateral line. Eye 3 inches in diameter. Lower line of body straight.' A few months ago we received a specimen from a Hull trawler. It was 6 feet long, 12 inches wide, and the eye $2\frac{1}{2}$ inches across. It had been 'exhibited' just a little too long when we received it, but a plaster cast was taken.—T. SHEPPARD, Hull.

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Part 14 of Major Barrett-Hamilton's *History of British Mammals* has been published, and deals with the dormouse and bankmouse. There are also a number of plates and illustrations in the text. The part also contains an appreciative notice (with portrait) of the late Dr. Edward A. Wilson, whose drawings have so improved the work. Dr. Wilson, it will be remembered, perished in the British Antarctic Expedition.

Naturalist,

YORKSHIRE NATURALISTS AT GREAT AYTON.

THE August meeting at Great Ayton brought to a close the Union's general field excursions for the year. Considering that the area for investigation included such excellent working ground for all sections it was surprising that the attendance was so moderate, even the members of the local Societies failing to bring Monday's excursion to anything like the numerical standard that might have been expected. The headquarters were at the Buck Hotel and members arrived on Friday and Saturday, twelve of the affiliated Societies being



Photo by]

[Godfrey Bingley.

The house (ivy-covered) where Capt. Cook's father lived; Great Ayton.

represented. The Yorkshire Geological Society, with its headquarters at Saltburn, also took part in the excursions.

There are no congested areas about Great Ayton, the village extending a mile and a half in length. One of its most notable habitations is the place where Captain Cook, the circumnavigator, received his education. To his memory is a monument on Easby Hill.

Mr. J. J. Burton had control of the local arrangements and also acted as leader of the geological excursions; Mr. T. A. Lofthouse performing similar office for the rest of the party.

On Saturday the geologists spent the day on the Whin Dyke, or Cliff Rigg, a prominent local landmark, and noted the physical changes produced in the lias shales, examined exposures thereof, and also of the Estuarines of the Inferior Oolite. Monday was devoted to an examination of Roseberry Topping, the conical height of which is the dominating feature of the district.



Photo by]

[Godfrey Bingley.

The old school-house, Great Ayton, where Capt. Jas. Cook was taught.

The other sections devoted Saturday to an investigation of Airyholme Woods, and afterwards in the neighbourhood of Slacks, Howden Gill, and Gribdale Gate. An examination was also made of the Whin Dyke and Roseberry Topping, where the fossil plant bed received much attention. On Monday they spent the whole of the day in the magnificent woods at Kildale and Easby. After a climb to the upper woods the extended view was obtainable of the pastoral plain of Cleveland with its

Naturalist,

encircling chain of hills; Ingleby and Broughton Rises, with the entrance to Biltsdale.

At the business meeting Mr. G. T. Porritt occupied the chair. Brief reports on the various sections were given, more detailed particulars of which are appended. Votes of thanks were accorded to Mr. Burton and Mr. Lofthouse for their services, and to Messrs. J. B. Hodgkin, J. J. Emerson, R. P. Turton, the owners of the Airyholme Estate, the Roseberry and Cockshaw Mines, and the Gribdale Mining Co., Ltd., for their courtesy in granting permission to visit their estates.

W.E.L.W.

LEPIDOPTERA.—Mr. T. A. Lofthouse writes:—Although the weather was fine, lepidoptera were noticeably scarce, even for this season. It is possible that the very wet weather prevalent last year and the early part of this year and the cold and sunless summer may be accountable. Most of the species recorded only occurred singly or in very small numbers, in fact, very few insects of any kind were beaten out during a considerable time devoted to this mode of collecting. Sugaring was tried on one evening at Kildale but not a single lepidopterous insect was attracted.

The following is a list of the species taken or noticed:—

Epinephele ianira.
Cænonympha pamphilus.
Trochilum crabroniformis (Saw one on 2nd August apparently just freshly emerged.)
Noctua xanthographa.
Calymnia trapezina.
Metrocampa margaritaria.
Venusia cambrica.
Larentia didymata.
Eupithecia pulchellata (larvæ).
Eupithecia valerianata (larvæ).
Hypsipetes sordidata (Bilberry varieties).
Melanthia bicolorata.
Campogramma bilineata.
Cidaria immanata.
C. populata.
C. fulvata.
Eubolia mensuraria.
Anaitis plagiata.
Scoparia ambigualis.
Scopula olivialis.
S. prunalis.
S. lutealis.
Crambus tristellus.
C. culmellus.
Tortrix ribeana.
T. viridana.
T. forsterana.
Peronea caledoniana.
Dictyopteryx forskaleana.

Argyrotoxa conwayana.
Penthina sauciana.
Sericoris lacunana.
Sciaphila subjectana.
Bactra lanceolata.
Grapholitha penkleriana.
G. nevada.
G. geminana.
Pædisca corticana.
P. occultana.
P. solandriana.
Olindia ulmana.
Coccyx tædella.
Argyrolepis cnicana.
Aphelia osseana.
Scardia cloacella.
Prays curtisellus.
Plutella cruciferarum.
Cerostoma costella.
Harpieteryx xylostella.
Depressaria liturella.
Brachycrossata cinerella.
Æcophora fuscescens.
Argy ephippella.
A. albistria.
A. conjugella.
A. retinella.
A. curvella.
A. sorbiella.
A. gædartella.
A. nitidella.
Cedestis farinatella.

COLEOPTERA.—Mr. M. L. Thompson reports that the following Beetles were met with along the route through Airyholme Wood, along the moorlands ridge above Gribdalegate and through Lonsdale to Kildale. The list also includes a number of species taken by Mr. W. P. Winter while searching for spiders:—

Notiophilus palustris Duft.
Nebria brevicollis F.
Calathus melanocephalus L.
C. flavipes Fourc.
Olisthopus rotundatus Pk.
Trechus minutus F.
Helophorus brevipalpis Bed.
Homalota xanthoptera Steph.
H. fungi Grav.
Antalia impressa Ol.
Gyrophæna gentilis Er.
Tachinus rufipes De G.
Bolitobius trinotatus Er.
B. pygmæus F.
Mycetoporus clavicornis Steph.
Quedius mesomelinus Marsh., var.
fagei Th.
Q. molochinus Grav.
Philanthus varius Gyll.
Stenus impressus Germ.
S. nitidiusculus Steph.
S. tarsalis Linn.
Oxytelus tetracarinatus Block.
Anthophagus testaceus Grav.
Proteinus brachypterus F.
Adalia oblitterata L.

Halyzia 14-guttata L.
Meligethes æneus F.
Atomaria fuscipes Gyll.
A. pusilla Payk.
Ephistemus gyrinoides Marsh.
Adrastus limbatus F.
Cyphon coarctatus Payk.
Malthodes marginatus Lat.
M. mysticus Fries.
Phyllodecta vitellinæ L.
Longitarsus gracilis Kuts.
Apteropeda orbiculata Marsh.
Crepidodera transversa Marsh.
Rhinosimus planirostris F.
Anaspis maculata Fourc.
Anthicus floralis L.
Apion apricans Hbst.
Otiorynchus picipes F.
Sitones lineatus L.
Liosoma ovatum Clair.
Rhamphus flavicornis Clair.
Grypidius equiseti F.
Cæliodes quercus F.
Ceuthorhynchus ericæ Gyll.
C. contractus Marsh.

The most interesting of these insects is *Mycetoporus clavicornis* (type form) of which a single specimen was swept from mixed herbage on the edge of Airyholme Wood. Although the variety *forticornis* has twice occurred at Saltburn, the type form does not appear to have been previously met with in Yorkshire.

BOTANY.—Dr. W. G. Smith writes:—The week-end gave an excellent opportunity for examining a series of woods on the escarpments and slopes of the western end of the area of Cleveland, north of the Esk. A short time was spent on the moor proper, just sufficient to indicate the strong contrast between the vegetation of the shallow moor soils, now in a very dry state, and the more luxuriant growth of the moister lower slopes. A feature of this district of the Cleveland is the large extent of the moor-plateau and the heathery slopes planted up with Scots Pine and Larch. Several of the older woods illustrate how well these steep Cleveland slopes are adapted to produce useful timber. Some of the more recent plantations include a considerable proportion of Japanese Larch; this species is now being tried in many parts of Britain to see whether it will prove more resistant to larch-canker, and in Kildale woods it is

growing much faster in its earlier years than the common Swiss Larch. The ground-vegetation of these higher woods is heathy. One old open Pine plantation on the moor edge had Hair Grass (*Aira flexuosa*) forming a dense turf. In a recent Pine clearing, the plants formerly kept in check by the tree-canopy were very vigorous in the open, e.g., Bilberry and Crowberry; *Trientalis europæa* and some of the woodland ferns were still present as vestiges of the shade vegetation of pine woods.

The woods of the Airyholme Valley are mainly on heavy clays with numerous wet flushes, many of which were still muddy and boggy in spite of the long spell of drought. The extent of these flushes is indicated by the abundance of the typical flush-trees, Alder and Willow, while their margins are characterised by Ash, which in these lower levels is more abundant than the Oak. The presence of much Hazel in the undergrowth is another feature of the moist Oak-Ash woods found in many parts of Britain. The ground vegetation of this, the summer period, mainly consists of *Oxalis acetosella*, *Mercurialis perennis*, *Ajuga reptans*, *Nepeta hederacea*, *Circæa lutetiana*, *Asperula odorata*, *Lastræa Filix-mas* and *L. Filix-femina*, while Mr. Ingham named *Hylocomium squarrosus* and *Catherinea undulata* as common mosses. As traces of the spring vegetation, *Primula*, *Scilla*, and *Lychnis diurna* could still be distinguished. The woods of the Leven valley from Kildale to Great Ayton belong to the same moist type with much Alder and Ash, and *Campanula latifolia* was seen occasionally. An old plantation of Beech included fine specimens of Silver Fir (*Abies pectinata*) and American Hemlock Fir (*Tsuga*).

Mr. W. E. L. Wattam adds:—The first plant to attract attention was undoubtedly *Matricaria discoidea* bordering the waste of every highway, and dominating the rough cart tracks of pasture and arable ground; in places so thickly clustered as to exclude all other vegetation. It was noted in similar situations at Kildale and Easby. The hedgerow bases in the immediate vicinity of Great Ayton yielded *Geranium pratense*, *Chærophylloides temulum*, *Vicia Cracca*, *Calamintha acinos*, and *Betonica officinalis*; the latter plant was a conspicuous feature of the pastures, as was also *Linum catharticum*, and *Crepis virens*. Goutweed and Good King Henry, Musk Mallow and Tuberous Comfrey were also noted. The borders of corn-fields were denizenized by *Anthemis arvensis*, *Anagallis arvensis*, *Polygonum Convolvulus*, and *Euphorbia exigua*. The river Leven through the village yielded *Veronica Beccabunga*, *Epilobium hirsutum*, *Polygonum amphibium*, and *Potamogeton crispus*. The flora of the tram track through Marwood Quarries proved most interesting. An abundant plant was *Senecio viscosus*; *Arenaria serpyllifolia*, *Reseda luteola*, *Hypericum*

perforatum, *Hyp. hirsutum*, *Arctium minus*, and *Galeopsis Tetrahit* were likewise common. Undoubtedly the most conspicuous were the Willow-herbs (*Epilobium angustifolium*, *E. hirsutum*, *E. parviflorum*, *E. montanum*), and near the water tanks, a variety of *E. tetragonum* which appeared after examination to answer to var. *Lamyi* Schultz. In the woods at Kildale and Airyholme was a shade form of *Teucrium scorodonia* with leaves five to six inches in length, by two and a half inches broad across the centre of the blade; the petiole being half an inch in length. In a pasture near Easby the mode of sucker reproduction by the Canadian Poplar (*Populus canescens*) was well evidenced by a miniature plantation of young trees, many of which were distant some ten yards from the parent tree. The most conspicuous grass of the hedgerows was *Arrhenatherum avenaceum*, whilst *Phleum pratense* was abundant by roadside waste. *Aira praecox* and *Triodia decumbens* were observed on Easby Moor, and in Kildale Woods was the uncommon fern, *Polystichum aculeatum*. On a bit of moorland above Kildale was an abundance of *Tricentalis europæa* in fruit.

An investigation of a portion of the Whin Dyke, while crossing to Roseberry Topping, exhibited some interesting phases of plant life. After passing through the woods the lias shales were met with. Their base supports an abundance of *Rubus fruticosus*, *Arctium minus*, *Digitalis purpurea* and *Urtica dioica*. The middle portion of the shale debris and ledges is controlled almost entirely by *Teucrium scorodonia*, while on the summit is *Teucrium* and Bracken, the chief grasses being *Arrhenatherum* and *Agrostis*. Continuing the climb to where the old workings are revealed by an immense dyke, the first feature of the flora was a large area dominated entirely by *Nepeta hederacea*, passing into a zone controlled by a splendid growth of *Teucrium* and *Holcus*, terminated by Bracken areas, with winding strips of softer grass sward of *Agrostis* intermingled with which is *Galium verum* and *Thymus serpyllum*. At the base of Roseberry Topping was *Hypericum humifusum*.

MOSES AND HEPATICS.—Mr. Wm. Ingham, BA., writes :—As the mosses of the district have been very well worked, the chief attention at this excursion was given to Hepatics.

HEPATICS.—On Roseberry Topping only two Liverworts were seen, *Lophozia ventricosa*, and *L. Floerkii*. In Kildale Wood the prominent Hepatic was *Haplozia crenulata* which occurred in extensive vivid green sheets on the sloping clay banks. In one wet place was a very large form, known on the continent as forma *elatio*r Gottsche.

By the river and in a ditch by the path was *Pellia Fabroniana* var. *lorea*, in large patches, this variety being rare at present. Another interesting plant was *Haplozia sphaerocarpa*

var. *nana*, which also grows near Marske Mill, Saltburn. The two wide-spread plants *Conocephalum conicum*, and *Pellia epiphylla* were frequent in the wood.

MOSESSES.—Roseberry Topping was almost devoid of mosses, the only one seen being the ubiquitous *Tortula muralis*. On a sloping bank near Great Ayton was plenty of *Polytrichum urnigerum* in abundant fruit. In Kildale Wood were *Hypnum exannulatum* var. *pinnatum* growing with the large *H. crenulata* above mentioned, also a stout form of *Hypnum stramineum* simulating *H. sarmentosum* in habit.

MYCOLOGY.—Mr. Crossland writes :—The three mycologists, Mr. Gibbs, Miss C. A. Cooper and the writer devoted one of the days to a short length of Airyholme Woods lying in the hollow between Easby Bank and Roseberry Topping. The tree denizens are spruce with a sprinkling of alder, poplar and elder, with larch on the sides of the slopes. Apart from the circular beds of fallen fir needles the floor of the wood was richly carpeted with moss and moisture-loving phanerogams. There were several little piles of half-rotten, moss grown, pine logs, typical breeding grounds which a mycologist loves to investigate. Here we had a really good time at very little trouble. Among the larger species were several fine tufts of the anise scented *Lentinus cochleatus*, and many sporophores of *Polyporus varius*. Here also were found eight of the ten mycetozoa. The species noted in Airyholme are marked A.

Miss Cooper and Mr. Gibbs joined the party in Kildale on Monday. The fungi gathered in that locality are marked K. The remainder were noticed about Great Ayton. At Easby a quantity of young *Populus canescens* arising from suckers were affected with *Melampsora æcidioides*, the bright orange spots of the disease giving the leaves a peculiar appearance.

Pasture species were scarce, probably on account of the dry weather. The pasture and dung fungi were all found in the vicinity of Great Ayton.

The 132 species met with are here classified according to habitat. The names are as in the Yorks. Fungus Flora. Those marked (*) are new county records. *Gnomonia herbicola* A.L. Sm., new sp., Brit. Myc. S. Trans., 1909, p. 221, was first found by Mr. Gibbs at Wirksworth, 1908. *Lactarius tabidus* was first found in Britain in Mulgrave Woods, 1910.

PARASITES.

Armillaria mellea A.
Polyporus hispidus. On ash. A.
Fomes igniarius K.
Hirneola auricola-judæ. On
 elder. A.K.
 **Melampsora æcidioides*. On
 leaves of young *Populus canes-*
cens E.

Coleosporium sonchi. On colts-
 foot. K.
C. euphrasizæ. On eyebright. K.
Ustilago violacea. On the anthers
 of *Lychnis diurna*. A.
 **Gnomonia herbicola*. On stems
 of *Epilobium hirsutum*. A.
Podosphæria oxyacantha. On
 hawthorn leaves.

Erysiphe cichoracearum. On cow-parsnip. K.
Ramularia calcea. On leaves of ground-ivy

SAPROPHYTES.

On rotting stumps, fallen trunks, branches, twigs, bark, chips, and worked wood.

Mycena galopoda. A.
M. galericulata. A.K.
M. hæmatopoda. A.
Omphalia bullata. K.
Pluteus cervinus. A.K.
Pholiota marginata.
Flammula sapinea. A.
Hypholoma sublateritium. A.
H. capnoides. A.
H. fascicularis. A.K.
Psathyra bifrons. K.
Lentinus cochleatus. A.
Polyporus varius. A.
P. cæsius. K.
Polystictus versicolor.
Poria vaporaria.
P. blepharistoma. A.
P. sanguinolenta. A.
Daedalea quercina. K.
Hydnum niveum. A.
Phlebia contorta. A.
Grandinia granulosa. A.
 * *Corticium sub-coronatum*. A.
Tomentella fusca. A.
Dacryomyces stillatus.
Calocera viscosa. A.
Xylaria hypoxylon.
Byssosphaeria aquila. A.
Lastosphaeria ovina. K.
Psilosphaeria spermoides. K.
Melanomma pulvis-pyrius.
Lachnea scutellata.
L. erinacea. A.
Dasyscypha nivea.
D. hyalina.
Chlorosplenium æruginosum. A.
Helotium lutescens. A.K.
H. scutula.
Mollisia cinerea.
Orbilha leucostigma. A.
 Also var. *xanthostigma*. A.
Bactridium flavum. A.
 The following ten belong to the Mycetozoa :—
Ceratiomyxa mucida. A.
Tubulina cylindrica. K.
Cribraria argillacea. A.
Stemonitis Friesiana. K.
S. fusca. A.
Arcyria punicea. A.
A. cinerea. A.

Trichia fragilis. A.
Tilmadoche nutans. A.K.
T. mutabilis. A.K.

On dead herbaceous stems and leaves.

Marasmius graminum. K.
M. epiphyllus. K.
Phyllachora pteridis. A.
Metasphaeria complanata.
Raphidospora rubella.
R. acuminata.
Heptameria doliolum.
H. acuta.
H. derasa.
 * *H. clivensis* (= *Leptosphaeria clivensis*).
Pleospora herbarum.
Dasyscypha virginia.
Helotium cyathoides.

On humus or soil mostly in woods or other shaded places.

Ithyphallus impudicus. A.
Amanita rubescens. A.
Amanitopsis vaginatus. A.
Tricholoma rutilans. K.
Laccaria laccata. A.K.
Collybia butyracea. K.
Mycena metata. A.
M. filipes. A.
M. sanguinolenta. A.K.
Omphalia umbellifera.
O. fibula.

Also var. *swartzii*.

Inocybe geophylla. A.
Galera hypnorum. A.
Stropharia æruginosa. A.
Paxillus involutus. A.
Lactarius blennius. K.
L. quietus. K.
L. glycosmus. K.
L. mitissimus. A.
L. tabidus. A.
L. minimus. A.
Russula nigricans. K.
R. adusta. K.
R. chloroides. K.
R. rubra. K.
R. cyanoxantha.
R. foetens. K.
R. fellea. K.
R. fragilis. K.
R. integra. K.
Cantharellus aurantiacus. A.
Marasmius peronatus
Boletus flavus. A.
B. chrysenteron.
Poria terrestris. A.
Geopyris cupularis. A.

Peziza badia. A.
Lachnea umbrorum. A.
L. dalmeniensis. A.
Sphærospora trechispora. A.K.
Isaria farinosa. A.

In pastures.
Nolanea pascua.
Agaricus campestris.
Psilocybe foenicicli.
Psathyra corrugis.
Bovista nigrescens. Last year's
 growth.

On dung, mostly in pastures.

Stropharia semiglobata.
Panaeolus retirugis.

Coprinus radiatus.
Humaria granulata.

Ascobolus furfuraceus.

Ascophanus carneus.

A. equinus.

Pilobolus crystallinus.

Mucor mucedo.

Var. *caninus.* On dog-dung in
 tomato-house, where it ought
 not to be.

—:o:—

Toadstools and Mushrooms of the Country side, by Edward Step, F.L.S. Price 5s. net, pp. xvi+143. A handy little book written in a popular style, and intended for the benefit of the country Rambler as an aid to the identification of some of the larger fungi likely to be met with. In this it will serve its purpose so far as black-and-white photographs supplemented by popular descriptions can. It is illustrated by 8 coloured and 128 half-tone plates. Each illustration is accompanied by a chatty discourse on the object represented, fully detailing all its observable features, time of appearing, and habitat. Edible qualities are not by any means overlooked. Each treatise is headed by both common and technical name. The introduction contains a very good popular general description of the structure of a toadstool and its method of growth. The photos, mostly full page, well represent the species, and were they in natural colours would be perfection; plates 13 and 86 are rather poor. The book appears at a very opportune time of the year, when the woodland Rambler will not have far to seek ere he finds an opportunity of making practical use of the work. There is a very useful and most instructive chapter on toadstool-hunting; an index of both common and technical names; and a classified list of the species described. The book is nicely got up, and a convenient size and shape for the pocket.—C.C.

Flowerless Plants: How and Where they Grow. By S. Leonard Bastin. Cassell & Co., 1913. Pp. xi.+152. 6s. net. This is one of the numerous natural history books, with attractive illustrations, published by Messrs. Cassell. The author tells us his aim is to deal with flowerless plants on nature-study lines, and adopts a racy and simple style easily followed by non-botanical readers. The book opens with a general survey in which the lower plants are compared with the Angiosperms. The remaining six chapters deal with ferns, mosses, liverworts, algæ, lichens, and fungi. The illustrations, some of which are excellent, consist of four autochrome plates and seventy-nine photographs taken by the author. His treatment of the plants selected for notice is usually very superficial, and betrays a want of knowledge of the true nature-study method. Some of his descriptions are not very illuminating, e.g., on page 126, dealing with fungi, he says that because of the absence of chlorophyll these plants 'cannot live independently. Hence we shall always find fungi living on something.' Which is doubtless true. Again, 'the brown dust' from the gills of a mushroom, when examined under a magnifying glass, 'is resolved into atoms which have been called spores.' The *Zygnemas* are described (page 89) as 'cloudy masses pale green in colour,' and are illustrated by a photo-micrograph of a meshwork of four or five filaments and labelled 'A Fresh-Water Tree.' In dealing with the several large divisions of plants he seldom brings out clearly the great differences between them and fails to indicate the more important lessons to be learnt from their study.

NOTES ON THE BLUE-GREEN ALGÆ, WITH A KEY TO THE SPECIES OF OSCILLA- TORIA AND PHORMIDIUM.

HAROLD WAGER, F.R.S.

(Continued from page 308).

A large number of species are not considered here, either owing to the uncertainty of their diagnosis or because of their rarity. Lists will be found in Gomont and De Toni. I have only included the better-known species, such as are likely to be met with, but I have included all that are described as good species by Gomont and Tilden

At the end of the description of every species will be found references to Gomont, 'G,' and to Tilden, 'T,' giving the page, number of plate, and references to the figures given by each of these authors for the species. Thus, G. 218, 6, 22-23, means Gomont's Monograph, page 218, Plate 6, Figs. 22-23, and the same order is used for the references to Tilden's monograph.

The key is only useful for purposes of a preliminary diagnosis. In the final determination of the species reference must be made to one of the monographs on the group. For the convenience of students keys to the orders and families of the Blue-green Algæ, and to the chief genera of the family Oscillatoriaceæ are also given.

KEY TO ORDERS AND FAMILIES OF THE BLUE-GREEN ALGÆ.

1. Filamentous, multicellular plants; reproduction by
hormogones; trichomes in a sheath or free
Order I., **Hormogoneæ** 2
 1. Unicellular plants, sometimes in colonies in a gelatinous
mass; reproduction by spores or simple division
Order II., **Coccogoneæ** 7
- Order I., **HORMOGONEÆ.**
2. Trichomes equal in diameter throughout or attenuate
at apex, sometimes torulose, Sub-Order I., **Psilonemateæ** 3
 2. Trichomes strongly tapering, either from the base
or from the middle towards both ends to form
hair-like prolongations Sub-Order II., **Tricophoreæ** 6
- Sub-Order I., **PSILONEMATEÆ.**
3. Heterocysts present; sheaths present 4
 3. Heterocysts absent; sheaths present or not
Fam. IV., **Oscillatoriaceæ**
 4. Trichomes of one or more rows of cells; filaments
branched; sheaths thick and firm, Fam. I., **Stigonemaceæ**
 4. Filaments with false branching or none; trichomes
of a single row of cells 5

5. Filaments with false branches; sheaths firm and tubular
Fam. II., *Seytonemaceæ*
5. Trichomes not branched; cells in a single row, generally
torulose, in a gelatinous mass .. Fam. III., *Nostocaceæ*

Sub-Order II., TRICHOPHOREÆ.

6. Trichomes tapering from base; apex piliferous;
heterocysts rarely absent .. Fam. V., **Rivulariaceæ**
6. Trichomes tapering towards each end; heterocysts
absent Fam. VI., **Camptotrichaceæ**

Order II., COCCOGONEÆ.

7. Unicellular, attached by the base to other algæ; reproduction by asexual non-motile spores
Fam. I., **Chamæsiphoniaceæ**
7. Unicellular, usually in colonies in a gelatinous envelope, sometimes free Fam. II., **Chroococcaceæ**

KEY TO GENERA OF OSCILLATORIACEÆ.

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Sheaths absent or apparently so | 2 |
| 1. Sheaths present | 5 |
| 2. Trichomes straight or curved | 3 |
| 2. Trichomes in a regular spiral | 4 |
| 3. Trichomes free; sheath absent or exceedingly thin, Oscillatoria | |
| 3. Trichomes with delicate, hyaline sheaths, often difficult to see; filaments more or less agglutinated, mucus-like or diffuent | |
| 4. Trichomes in a regular spiral, multicellular, Arthrospira | |
| 4. Trichomes in a regular spiral, unicellular .. Spirulina | |
| 5. Several trichomes within a sheath | 6 |
| 5. Not more than one trichome in a sheath | 9 |
| 6. Sheaths firm, lamellose, coloured or transparent | 7 |
| 6. Sheaths hyaline, more or less mucous | 8 |
| 7. Filaments branched or simple; trichomes may be densely aggregated in the sheath, which is usually coloured, Schizothrix | |
| 7. Sheaths with few trichomes, transparent or yellowish, not capitate | |
| 8. Trichomes few within a sheath; apex capitate (marine) | |
| 8. Trichomes many in a sheath | |
| 9. Filaments simple | 10 |
| 9. Filaments often with false branches | 11 |
| 10. Filaments free; trichomes surrounded by a firm sheath | |
| 10. Trichomes with delicate hyaline sheaths .. Lyngbya | |
| 11. Plant mass dense, with tufts of filaments; sheaths colourless, thin, firm; false branches solitary Symploca | |
| 11. Filaments free or forming felt-like masses, sometimes floating; filaments branched like <i>Scytonema</i> , but no heterocysts are present; sheaths usually colourless, rarely yellowish, firm (genus frequently included in <i>Scytonemaceæ</i>) | |
| Plectonema | |

KEY TO SPECIES OF OSCILLATORIA AND PHORMIDIUM.

- | | | | |
|-----------------------------------------------------|----|----|---|
| I. Trichomes attenuate or tapering at the apex | .. | .. | 2 |
| I. Trichomes not attenuate nor tapering at the apex | .. | .. | 3 |
| 2. Acute attenuate | .. | .. | 4 |
| 2. Obtuse or capitate | .. | .. | 5 |

3. Capitulate or sub-capitulate; stratum dark-coloured, **O. irrigua**
 Trichomes 6-11 mic. in dia., straight, not torulose; apex not tapering; cells 4-11 mic. long; * apical cell convex with thickened membrane. In stagnant or running water, ditches, etc. (G. 218, 6, 22, 23).
3. Not capitulate 6
 4. Very acute 7
 4. Sometimes more rounded at apex or conical 54
 5. Capitulate or sub-capitulate 8
 5. Not capitulate or only very slightly so 9
 6. Not more than 4 mic. in dia.; cells usually equal to or longer than the diameter 10
 6. More than 4 mic. in diameter; cells usually much shorter than the diameter, occasionally longer 11
7. Trichomes 3-5 mic. in diameter **O. acuminata**
 Stratum bright blue-green; trichomes straight, fragile, constricted at joints; apex tapering, curved, rarely straight; cells 5-5.8 mic. long, trans. walls with granules; apical cell sharply pointed. In warm salt water. (G. 247, 7, 12; T. 78, 4, 29.)
7. Trichomes 6-8 mic. in diameter **O. janthiphora**
 Trichomes dark green, straight, fragile, not constricted at joints; apex tapering, curved or lax spiral; cells 3.4-6.7 mic. long, trans. walls slightly granular; apical cell sharply pointed. (G. 233, 7, 20-21.)
8. Trichomes 10 or more than 10 mic. in diameter, or variable 4-11 mic. in diameter 12
 8. Trichomes 9 or less than 9 mic. in diameter 13
 9. Length of cells nearly equal to or longer than the diameter, always more than half the diameter 14
 9. Cells distinctly shorter than their diameter 15
 10. Torulose or constricted 16
 10. Not torulose 17
11. Trichomes more than 10 mic. in diameter; length of cells not more than a quarter of the diameter 18
 11. Trichomes usually less than 10 mic. in diameter; cells longer than a quarter of the diameter, sometimes as long as or longer than the diameter 19
 12. Trichomes never less than 10 mic. in diameter, often much more 20
12. Filaments 5.5-11 mic. in diameter **P. subfuscum**
 Stratum a thin, dark green or olive green mass; trichomes fragile, straight, not constricted at joints, agglutinated; apex capitulate, not curved, slightly tapering; calyptra conical; transverse walls with cyanophycin granules; On wood, rocks, etc., in fresh water. (G., 182, 5, 17-20; T., 105, 5, 12-15.) Var. × and Var. joannianum, see G., p. 184.

* The measurements of length and breadth of the cells and filaments are given in microns. A micron = $\frac{1}{1000}$ of a millimetre, or about $\frac{1}{25000}$ of an inch.

13. Joints of the cells constricted 21
 13. Joints of the cells not at all constricted 22
 14. Torulose or moniliform 23
 14. Not torulose or, in specimens, slightly so 21
 15. Torulose 25
 15. Not torulose 24
 16. Thermal **O. geminata**
 Stratum dull yellowish-green; trichomes 2·3-4 mic. in diameter, curved or rolled, much constricted; apex straight or curved, not tapering, not capitate; apical cell rounded, no calyptra; cells 2·3-16 mic. long, with large refringent granules in the cytoplasm. (G., 222, 7, 6; T., 74.)
 16. Fresh water or terrestrial 48
 17. Thermal, trichomes 6-8 in diameter **P. treleasei**
 Stratum of many papery layers; trichomes 6-8 mic. in diameter, not constricted at joints; apex straight, rigid, not tapering, obtuse, no calyptra; cells up to 8·8 mic. long. (T., 96.)
 17. Sheath visible 26
 17. Sheath not present, not visible 27
 18. Plants found in salt waters **O. bonnemaisonii**
 Trichomes 18-36 mic. in diameter, forming loose and regular spirals, somewhat constricted at joints; apex not tapering, not capitate, no calyptra; cells 3-6 mic. long, transverse walls not granulated. On wet soil, salt marshes, marine algæ, etc. (G., 215, 6, 17-18; T., 68, 4, 10.)
 18. Plants in fresh water 70
 19. Cells nearly as long as broad or longer 65
 19. Cells half as long as broad or shorter 28
 20. Calyptra absent **O. princeps**
 Stratum dark green; trichomes 16-60 mic. in diameter, commonly 25-50 mic., straight, rigid; apex sub-capitate, slightly tapering, more or less uncinat; cells 3·5-7 mic. long, transverse walls not granulated. Of frequent occurrence in ponds and quiet waters on the mud, then floating. (G., 206, 6, 9; T., 62, 4, 3.)
 20. Calyptra present, or apical membrane thickened 29
 21. Cells equal in length to the diameter or longer **P. submembranaceum**
 Stratum leathery, dark green, sheaths absent; trichomes 5 mic. in diameter, constricted at joints, tangled, agglutinated; apex straight, tapering, capitate, calyptra conical; cells 4-10 mic. long. (G., 180, 5, 13; T., 104, 5, 6.)
 21. Cells shorter in length than their diameter **P. lucidum**
 Stratum black green, underneath layers more or less decoloured; trichomes 7-8 mic. in diameter, slightly flexuous, slightly constricted at joints; cells 2-2·5 long, transverse walls granular; apex straight, more or less tapering, capitate;

- apical cell rotund or sub-conical with calyptra. In warm water. (G., 179, 5, 11, 12.)
21. Trichomes in a lax spiral or irregularly contorted, **O. grunowiana**
 Stratum obscure green; trichomes fragile, 3.7-5.6 mic. in diameter, sometimes straight; apex not, or only slightly tapering, sub-capitate, no calyptra; cells 1.4-4 mic. long, constricted at joints; transverse walls sometimes granular. (G., 235.)
22. Apex straight, capitate; upper part of filament may be a lax contorted spiral 30
22. Apex more or less curved, capitate 31
23. Trichomes 1-2 mic. in diameter **P. tenue**
- Stratum membranaceous, thin, pale blue-green; trichomes straight, slightly constricted; apex may be curved or bent; apical cell acute-conical, not capitate, no calyptra; cells 2.5-5 mic. long, cell contents homogeneous. In fresh water, on pots in greenhouses, etc. (G., 169, 4, 23-25; T., 98, 4, 63-65.)
23. Trichomes 2.5-8.5 mic. in diameter 32
23. Trichomes 4.5-12 mic. in diameter 65
24. Trichomes 1-1.5 mic. in diameter 56
24. Trichomes 3-6.5 mic. in diameter 33
24. Trichomes 7.5-10.5 mic. in diameter **P. crouani**
- Stratum membranaceous, dark verdigris-green; trichomes slightly tapering; sheath may be visible; apical cell obtuse conical, calyptra absent; cells 4-8 mic. long, trans walls not granular, not constricted at joints. (G., 175, 5, 5.)
24. 15-24 mic. in diameter 50
25. Thermal, brackish or fresh water; apex curved, not spiral 34
25. In salt water; trichomes straight or curved, fragile 49
25. In stagnant water; apex in a lax spiral **O. ornata**
- Stratum dark blue-green; trichomes 9-11 mic. in diameter, slightly tapering, somewhat constricted at the joints; apical cell convex or obtuse, not capitate, no calyptra; cells 2-5 mic. long, granules frequently on transverse walls; inflated, refringent cells here and there. (G., 214, 6, 15; T., 67, 4, 8.)
26. Stratum leathery, dark violet **P. purpurascens**
- Filaments twisted, entangled, agglutinated; trichomes 1.5-2.5 mic. in diameter, not constricted at joints; apex neither tapering nor curved, rounded; calyptra absent; cells 2-4.5 mic. long, four granules on transverse walls. Thermal. (G., 166, 4, 19; T., 95, 4, 59.)
26. Stratum thick, slimy, dull green **P. valderianum**
- Filaments flexuose, entangled; trichomes 2-2.5 mic. in diameter, straight, not constricted; apex not tapering, rounded, no calyptra; cells 3.3-6.7 mic.

- long; two or four granules on transverse walls. Thermal or in brackish or fresh water. (G., 167, 4, 20; T., 98, 4, 66).
26. Stratum thin membranaceous, or thick and encrusted with lime 53
27. Trichomes more than 2 mic. in diameter 67
27. Trichomes less than 2 mic. in diameter 69
28. Sheath not present **O. tenuis**
- Stratum thin, bright blue-green or obscure green; trichomes 4-10 mic. in diameter, straight, fragile, constricted at joints; apex not tapering, not capitate; apical cell with slightly thickened membrane; cells 2.6-5 mic. long; trans. walls with granules. In stagnant water, frequent; on rocks and trunks of trees; on mud by the roadside, margins of ponds, etc. (G., 220, 7, 2, 3; T., 71, 4, 17-18.) Var. natans and var. tergestina (See G., 221).
28. Sheath present and usually visible 55
29. In fresh water; transverse walls not granulated, **O. proboscidea**
- Stratum dark green; trichomes 12-15 mic. in diameter, straight or flexuose, not constricted at joints; apex tapering, capitate, hooked or terebriform; apical cell convex or flattened with slightly thickened membrane; cells 2-4 mic. long. In fresh water, on rocks in streams, in ditches, etc. (G., 209, 6, 10-11; T., 64, 4, 4.)
29. In warm or fresh waters; transverse walls granulated, **O. sancta**
- Stratum dark lead-coloured, violet when dried; trichomes 10-20 mic. in diameter, straight or curved, constricted at joints; apex slightly tapering, sub-capitate, calyptra convex conspicuous; cells 2.5-6 mic. long. In warm and fresh waters, on wood and earth, in greenhouses, etc. (G., 209, 6, 12; T., 64, 4, 5.)
- Var. caldariorum and var. æquinotialis (see G., 210.)
29. In salt water 72
30. Plants floating 35
30. Plants in warm or fresh water, on stones, wood, or aquatic plants, or in salt water 52
31. Stratum incrustated with lime **O. beggiatoiformis**
- Trichomes 4-5 mic. in diameter, more or less lax spiral or sub-erect, fragile, not constricted at joints; cells 4-7 mic. long, dissepiments with large granules; apex tapering, capitate; apical cell with conical calyptra. In acidulated water (Hungary). (G. 235, 7, 25.)
31. Stratum not incrustated with lime 36
32. In warm or fresh water 37
32. In brackish or salt water 51

(To be continued).

In Memoriam.

TEMPEST ANDERSON, M.D., D.Sc., J.P., F.G.S., F.R.G.S.
(1846—1913).

It is with very great regret indeed that we learn, as we go to press on the 29th August, of the death of the President-elect of the Yorkshire Naturalists' Union, Dr. Tempest Anderson. The loss will be keenly felt by all naturalists in the north, as well as by a large circle of scientific friends in various parts of the world. But nowhere will the loss be felt so much as in his native city of York, where he was the very heart and soul of the Literary and Philosophical Society, and took so great an interest in its museum.

Like his father, Dr. Anderson was a surgeon and held many important appointments in connection therewith. He specialised in diseases of the eye. Being a bachelor and exceedingly successful with his practice and in other ways, he spent much time in travelling and in investigating the various volcanic phenomena in all parts of the world. He was also an exceptionally good climber and photographer, both of which stood him in good stead in his researches. In this way he was enabled to prepare valuable and well illustrated memoirs on volcanic phenomena, notably dealing with Mont Pelée in Martinique, the Soufrière in St. Vincent, Matavanu in the South Sea Islands, etc. These were published by the Royal Society, the Royal Geographical Society, the Geological Society, etc. In 1902 he was sent to St. Vincent by the Royal Society, and, together with Dr. J. S. Flett, prepared a most valuable report on the devastation there caused. Dr. Anderson frequently lectured on his volcanic studies.

Socially, he was a great asset to York, being always most thorough in anything he undertook. He was the local secretary for the British Association when it met at York in 1881, and 25 years later when it again visited that ancient city. Dr. Anderson was a vice-president, and as president of the Philosophical Society right royally entertained the members in the charming and classical museum grounds. When he presided at the Annual Conference of the Museums Association at York in 1910 he was similarly generous. Quite recently, as announced in these columns, he has erected a large lecture theatre, etc., in connection with the museum, from funds placed at his disposal by his sister, Mrs. Sladen.

He was Sheriff of York in 1894. He was the recipient of many honours, but probably the honorary degree of D.Sc.,

Naturalist,

conferred upon him by the University of Leeds, was the one he treasured most.

Dr. Anderson died of enteric fever while on his way home from the Philippine Islands, and his remains will rest at Suez.

The toll upon Yorkshire scientific men has recently been exceedingly severe, and the present blow is especially so, as it was so unexpected.

A portrait of Dr. Anderson appeared in our issue for September, 1906, p. 283.

T S.

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NORTHERN NEWS.

We regret to record the death of Mr. J. Logan Lobley, F.G.S., at the age of 80.

Mr. Edward Lovett has published an interesting pamphlet on *The Gun-flint Industry of Brandon*.

We regret to record the death of Mr. Walter Jackson, of Goole, who took a keen interest in the work of the Yorkshire Naturalists' Union.

The Curator, Mr. S. L. Mosley, has issued a circular to say that the Huddersfield Museum is not a place of amusement, but an educational institution, and that teas are provided for large or small parties.

There is no ground for the rumour that two active Yorkshire ornithologists have joined the ranks of the militant suffragettes. The fact that they were on the Bass Rock when it was fired was merely a coincidence.

We regret to record the death of T. F. Jamieson, one of the pioneers of the land-ice hypothesis, and, in the early days of the controversy between the supporters of the land-ice and submergence theory, he took a very effective part.

The Annual Report of the Yorkshire Philosophical Society for 1912 contains an address on the 'Development of Education' by Dr. Bonney, and a paper on 'The Charm of St. Mary's Abbey and the Architectural Museum, York,' by Mr. E. Ridsdale Tate.

According to Leaflet No. 197 of the Board of Agriculture and Fisheries, which deals with Agricultural Education and Research in England and Wales, the Board now makes grants in aid of higher agricultural education to the extent of £18,500 per annum.

According to *The Yorkshire Post*, Mr. W. Hewett, of York, who has 'accumulated about 45,000 specimens,' has been awarded the Dunmow flitch of bacon for living twenty-five years without a quarrel with Mrs. Hewett. The report adds, with truth, that Mr. Hewett's 'merits and achievements' are well known to University professors and Museum curators. From another account we learn the happy possessor of the bacon has a family of 50,000 caterpillars, but as the bacon fell on one of them, there are now only 49,999, and two of these are sickly. Mr. Hewett is 'often to be seen, sometimes with his wife, dangling on a rope from the cliffs at Flamborough Head. He is of great renown, and possesses a collection superior to anything in the British Museum.' Another paper states that the collection of caterpillars, guillemots' eggs, and the like 'only contains 45,000 specimens,' but apparently the representative of that paper cannot count. Besides being photographed, the happy couple were 'cinematographed,' so that there will be a permanent record of this historic event. Mr. Hewett 'wears all his learning lightly,' and we join others in congratulating him upon his latest achievement.

NEWS FROM THE MAGAZINES.

Another alleged portrait of Gilbert White is reproduced in *The Selborne Magazine* for August.

In *The Zoologist* for August, Mr. R. S. Bagnall describes *Lithobius dubosqui*, Brölemann, a centipede new to the British fauna. It is recorded for Durham, Oxford and Manchester.

'*Andrena spreta*, Pér., by a *lapsus calami* recorded by me as *A. schenbella*, Pér., is the *A. niveata*, Saund., *nec* Friese.' (Dr. R. C. L. Perkins in *The Entomologist's Monthly Magazine* for August.)

Mr. Alfred Cresswell's useful *Records of Meteorological Observations taken at the Observatory, Edgbaston, 1912*, have recently been issued by the Birmingham and Midland Institute Scientific Society, at two shillings.

In a paper on new species of *Lema* in *The Entomologist* for August, Mr. F. W. Bowditch describes *Lema sheppardi* and several species of *Crioceris*, which have a geological appearance so far as the names are concerned.

In *The Entomologist's Monthly Magazine* for August Mr. F. H. Day records *Dyschirius angustatus* Putz. in Cumberland, originally found near Lanercost Abbey, Cumberland (not Northumberland, as stated by Fowler) and brought forward by Dawson as a novelty under the name of *sejunus* !

The recent Annual Report of the *Ruskin Museum*, Sheffield, shows a decrease of 1,154 visitors, 'due in a large measure to the exceptional inclemency of the summer season of 1912, and also to the increased counter attractions of the popular entertainment character that have during the last few years, developed to such an enormous extent.'

The Seventy-ninth Annual Report of the Bootham School Natural History, etc., Society, has had even more care than usual exercised in its preparation. There are satisfactory reports under the heads of Archæology, Botany, Conchology, Entomology, Ornithology, 'Pets,' and Microscopy. Apparently Geology has not been attractive this year.

Besides the paper on Foraminifera, referred to in another column, the *Journal of the Quekett Club* (No. 72) contains Notes on some Discoid Diatoms, by Mr. W. M. Bale; British Freshwater Rhabdocoelida, by Mr. H. Whitehead; Rotifers of Devil's Lake, by Mr. C. F. Rousselet; Five New Species of Bdelloid Rotifera, by Mr. D. Bryce, and the President's Address, on By-Products of Organic Evolution, by Dr. A. Dendy. There are also shorter notes.

We should like to congratulate the *Viking Society* and its editor upon the extraordinarily interesting and valuable character of Volume IV. of its *Year Book*, copies of which can be obtained from the University of London for half-a-crown. Nothing of moment bearing upon northern research appears to have escaped the eye of the editor, who has the ability to present the results of such research, no matter in what language published, in a simple and readable form.

In Mr. Mosley's monthly miscellany he refers to a recent critic (quite possibly *The Naturalist*) objecting to the first part of a new publication being styled Vol. 12. He states 'therefore, when a woman marries, or when Mr. Lubbock became Sir John, or when Sir John became Lord Avebury, they ought to have been born again.' We leave our readers to trace any connection; but better be born again than be cut to bits and served up as a variously numbered, dismembered and disconnected hash.

In his will the late Sir Jonathan Hutchinson left the following directions regarding his museums at Selby, Haslemere, and Chenies Street, London: 'I leave the three museums at Haslemere, Selby, and 22 Chenies Street, and their contents to my trustees upon trust to dispose of the same as they in their own absolute discretion shall think best, but my desire is that, without imposing any trust upon my said trustees, they shall dispose of my said museums and of their contents in accordance with my wishes expressed to them during my life.'

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THE MUSEUMS, HULL;

AND

T. W. WOODHEAD, Ph.D., F.L.S.,

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Exhibition of specimens. In addition to specimens of general interest, lepidopterists are especially requested to bring good series of *C. caja* and *L. marginata*.

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All members and associates of the Yorkshire Naturalists' Union are invited to attend and to bring any notes made during the past season. In order that a correct and complete account of all exhibits may be included in the report, the secretaries particularly request that each may be accompanied by a descriptive note.

Officials of affiliated societies are earnestly requested to notify their members.

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NOTES AND COMMENTS.

SIR OLIVER LODGE'S ADDRESS.

Sir Oliver Lodge's address to the British Association at Birmingham, which had received a certain amount of newspaper advertisement, was eagerly anticipated by the members, but whether their expectations were realized depends to a certain extent upon their individual tastes. Much had been made of Sir Oliver's apparent belief in a future state, but, as might have been expected, he was very guarded in his remarks thereon.

CONTINUITY.

Continuity was his theme, and this subject was reached after giving a complete review of recent researches in physical science—a subject Sir Oliver has made his own. 'Rapid progress was not characteristic of the latter half of the nineteenth century—at least not in physics. Fine solid dynamical foundations were laid, and the edifice of knowledge was consolidated; but wholly fresh ground was not being opened up, and totally new buildings were not expected. With the realization of predicted ether waves in 1888, the discovery of X-rays in 1895, spontaneous radioactivity in 1896, and the isolation of the electron in 1898, expectation of further achievement became vivid; and novelties, experimental, theoretical, and speculative, have been showered upon us ever since this century began. That is why I speak of rapid progress.'

EXISTING CONTROVERSIES.

He also referred to the dominating controversies existing in various branches of science. For example: 'in Physiology the conflict ranges round *Vitalism*. (My immediate predecessor dealt with the subject at Dundee.) In Chemistry the debate concerns *Atomic structure*. (My penultimate predecessor is well aware of pugnacity in that region.) In Biology the dispute is on the laws of *Inheritance*. (My nominated successor is likely to deal with this subject, probably in a way not deficient in liveliness.) And besides these major controversies, debate is active in other sections. In Education, *Curricula* generally are being overhauled or fundamentally criticized, and revolutionary ideas are promulgated concerning the advantages of freedom for infants. In Economic and Political Science, or Sociology, what is there that is not under discussion? Not property alone, nor land alone, but everything—back to the garden of Eden and the inter-relations of men and women. Lastly, in the vast group of Mathematical and Physical Sciences, slurred over rather than summed up as Section A, present-day scepticism concerns what, if I had to express it in one word, I should call *Continuity*.'

OUR DESTINY.

Sir Oliver states:—‘ Either we are immortal beings or we are not. We may not know our destiny, but we must have a destiny of some sort. Those who make denials are just as likely to be wrong as those who make assertions: in fact, denials are assertions thrown into negative form. Scientific men are looked up to as authorities, and should be careful not to mislead. Science may not be able to reveal human destiny, but it certainly should not obscure it. Things are as they are, whether we find them out or not; and if we make rash and false statements, posterity will detect us—if ever posterity troubles its head about us. I am one of those who think that the methods of Science are not so limited in their scope as has been thought: that they can be applied much more widely, and that the Psychic region can be studied and brought under law too. Allow us anyhow to make the attempt. Give us a fair field. Let those who prefer the materialistic hypothesis by all means develop their thesis as far as they can; but let us try what we can do in the Psychical region, and see which wins. Our methods are really the same as theirs—the subject-matter differs. Neither should abuse the other for making the attempt.’

OCCULT SCIENCE.

‘ In justice to myself and my co-workers I must risk annoying my present hearers, not only by leaving on record our conviction that occurrences now regarded as occult can be examined and reduced to order by the methods of science carefully and persistently applied, but by going further and saying, with the utmost brevity, that already the facts so examined have convinced me that memory and affection are not limited to that association with matter by which alone they can manifest themselves here and now, and that personality persists beyond bodily death. The evidence—nothing new or sensational, but cumulative and demanding prolonged serious study—to my mind goes to prove that discarnate intelligence, under certain conditions, may interact with us on the material side, thus indirectly coming within our scientific ken; and that gradually we may hope to attain some understanding of the nature of a larger, perhaps etherial, existence, and of the conditions regulating intercourse across the chasm.’

THE ADDRESS SUMMARISED.

Sir Oliver gives the following ‘ Summary of the Argument ’ : ‘ A marked feature of the present scientific era is the discovery of, and interest in, various kinds of Atomism; so that Continuity seems in danger of being lost sight of. Another tendency is toward comprehensive negative generalization from a limited point of view. Another is to take refuge in

rather vague forms of statement, and to shrink from closer examination of the puzzling and the obscure. Another is to deny the existence of anything which makes no appeal to organs of sense, and no ready response to laboratory experiment. Against these tendencies the author contends. He urges a belief in ultimate continuity as essential to science; he regards scientific concentration as an inadequate basis for philosophic generalization; he believes that obscure phenomena may be expressed simply if properly faced; and he points out that the non-appearance of anything perfectly uniform and omnipresent is only what should be expected, and is no argument against its real substantial existence.'

ETHER OR NO ETHER.

Following the Presidential Address, there was an interesting discussion on 'Radiation' in the Physical Science section. As the *Yorkshire Observer* points out—With complete obliviousness of the fact that there was anyone in the room of lesser degree than a senior wrangler they concentrated their attention upon the ether—the 'alleged' ether—and fought, with much consumption of chalk on the blackboard, their battle. Sir Oliver opened the matter in his presidential address—pro ether; one who denied its existence followed with an hour's debate; Sir Oliver responded by silently and solemnly writing a formula on the blackboard which, to the evident satisfaction of himself and many of the 'orthodox,' destroyed one of Mr. Jeans's elaborate calculations, and ether found another distinguished champion in Dr. Lorentz, who eventually summed up his view of the situation in the question—given with the more piquancy because of the speaker's foreign accent—what did it matter whether they called it ether or vacuum so long as it behaved like ether? Other contestants set themselves promptly to show that it did not behave like the ether as theory pictured it, and so the battle went on.

PROFESSOR GARWOOD'S ADDRESS.

In his Presidential Address to the Geological Section, Professor E. J. Garwood dealt with the part played by Calcareous Algæ in the formation of rocks. He stated that:— 'More than twenty years ago, whilst engaged in the study of the lower carboniferous rocks of Westmorland, I noticed the occurrence of certain small concretionary nodules of very compact texture, in the dolomites near the base of the succession in the neighbourhood of Shap. Shortly afterwards, when examining the Bernician rocks of Northumberland, I again met with similar compact nodular structures. It was obvious, however, even at that time, that the Northumberland specimens occurred here at a much higher horizon than those which I had observed in Westmorland. More recently, whilst

studying the lithological characters of the lower carboniferous rocks of the North of England and the Border country, I have been still further impressed by the abundance of these nodular structures at several horizons, and the large tracts of country over which they extend. An examination of these nodules in thin sections showed their obvious organic character, and I was at first inclined to refer them to the stromatoporoids. Dr. G. J. Hinde, who was kind enough to examine my specimens from the Shap district, reported, however, that they were probably not Stromatoporoids, but calcareous algæ, and referred me to the descriptions of *Solenopora* published by the late Professor Nicholson and Dr. Brown. Since then I have examined a large number of nodules collected from different horizons in the lower carboniferous rocks of Britain and Belgium; and the examination has convinced me that the remains of calcareous algæ play a very much more important part in the formation of these rocks than has hitherto been generally realized.

CALCAREOUS ALGÆ.

In conclusion Professor Garwood opined that 'The facts given regarding the geological distribution and mode of occurrence of these organisms lead us to several interesting conclusions. In addition to the evidence of the important part they play as rock-builders, it is evident that certain forms flourished over wide areas at the same geological periods, and might well be made use of in many cases with considerable reliability as proofs of the general contemporaneity of two deposits. Thus, as general examples, we may cite the wide distribution of *Solenopora compacta* in the Baltic Provinces, Scotland, England, Wales, and Canada during Llandilo-Caradoc times. The wonderfully persistent development of the *Rhabdoporella* facies over the whole of the Baltic area at the close of Ordovician times was of so marked a character that by means of boulders scattered over the North German plain it can even be made use of for tracing the direction of flow of the ice-sheet during glacial times. Again, to take examples nearer home. The *Ortonella* band found throughout Westmorland and north Lancashire near the summit of the Tournaisian occurs so constantly at the same horizon as to constitute one of the most valuable zonal indices in the succession of the North-West Province, and can be used with the greatest confidence not only for correlating widely separated exposures, but also affords valuable evidence in the case of tectonic movements. Other examples are supplied by the "*Girvanella* Nodular band" at the base of the upper Dibunophyllum zone, and the *Mitcheldeania gregaria* beds in the north of England and the Forest of Dean.'

ON A NEW TYPE OF GINKGOALIAN LEAF.

With the above heading, Mr. H. Hamshaw Thomas read an interesting note to the Botanical Section. He stated that in the Jurassic plant-bed of Cayton Bay, near Scarborough, a number of beautifully preserved leaves occur which belong to a new type. They are linear or oblanceolate in shape, with rounded or slightly bifurcated apices, short petioles, and dichotomising venation. The leaves are usually found in a mummified state; they can be readily detached from the rock, and yield beautiful cuticular preparations. The form of the stomata and subsidiary cells is very similar to that of other Ginkgoalian leaves, while they possessed the secretory tracts between the veins as seen in the modern form. The epidermal cells possess very characteristic papillæ. These leaves form the type of a new genus *Eretmophyllum*, with two species, a second form having been found at Whitby. The specimens provide a further illustration of the importance of the Ginkgoales in the Mesozoic vegetation, while they are an example of the interesting preservation of some Yorkshire plants and of the importance of the study of cuticular structure.

A NEW SPECIES OF MEDULLOSA FROM THE COAL.

Dr. E. de Fraine described a specimen which consisted of a short length of stem surrounded by adherent leaf-bases, and occurred in a coal-ball obtained from the Lower Coal Measures of Lancashire. The stem was of small size, the diameters of the transverse section being only 5 cms. \times 1.5 cm., including the leaf-bases. The vascular system of the stem consisted in the upper sections of three irregularly shaped outer steles, roughly triangular in outline; one of these steles branched during the length of stem available so that the lower sections of the series show a ring of four steles. The outer ring of steles encircles a small central strand or 'star ring,' which undergoes no change during the series, and forms the characteristic feature of the fossil. A narrow zone of periderm enclosed the vascular tissues of the stem. The numerous leaf-traces passed out from the peripheral parts of the outer steles. The leaf-bases showed a typical *Myeloxylon* structure with numerous exarch collateral bundles and abundant gum canals, and the hypoderma was of the *Myeloxylon Landriotii* type. In the general structure of the steles and of the leaf-bases and in its histological details the stem shows a very close resemblance to *Medullosa anglica*.

JURASSIC FLORA OF YORKSHIRE.

The Committee for the investigation of the Jurassic Flora of Yorkshire reported:—The work of the year has been very satisfactory. The rich plant-beds exposed on and near Roseberry Topping have been carefully examined and have yielded a large number of interesting forms, several of which are new to

Yorkshire. These plant-bearing strata are at the base of the Estuarine series, and may be probably regarded as Liassic in age and older than any of the previously known plant-beds. Among the specimens found are many beautifully preserved examples of two species of *Thinnfeldia*, a species of *Ptilozamites*, a species of *Hausmannia*, and a new conifer. A brief sketch of the flora has been given by the Secretary of the Committee in the *Naturalist* (p. 198, 1913). The occurrence of the plant-beds in the locality has been studied and proves to be very local. Some plant remains have been found in the Middle Estuarine beds of Eston Hill, one of the northern outliers of the Cleveland Hills.

THE GRISTHORPE BED.

The Gristhorpe bed continues to provide interesting forms. The excavations which have been carried on this year in Cayton and Gristhorpe Bays have resulted in the discovery of several new species. Among them is a new type of Ginkgoalian leaf, which has been described as *Eretmophyllum pubescens*, gen. et sp. nov.,* and this type has also been recognised at Whitby. A female flower of the *Williamsonia* type, new to England and probably allied to the *Wieldandiella angustifolia* of Nathorst, has been found, also a new fern and some seeds and cones of new types. Many specimens of the rare species *Beania gracilis*, Carr., *Baiera Lindleyana*, Schimp., and *Cladotheca undans*, L. and H., have been found, also some interesting forms of *Czekanowskia*. Material has also been obtained for the study of the cuticular structure of the Jurassic *Cycadophyta*, the results of which will be published shortly.

PREHISTORIC HORSES.

Dr. A. Irving read some notes on Prehistoric Horse Remains from the Stort Valley. He stated:—‘The present communication is a sequel to that made to Section H at the Portsmouth Meeting, 1911. Teeth and limb bones have since come to hand which fall into two series: (1) those of a horse of the Stortford-Grimaldi-Starnberg type; (2) those which answer to the “Solutrean” (*Equus robustus*) type of Professor J. C. Ewart. They have been found for the most part in and under the bottom of the “Rubble-Drift” of the valley, as that has been laid open in a continuous trench (3 feet 9 inches to 4 feet in depth) across the valley of the Stort nearly a mile and a half long for the purpose of laying down a new water-main. Others have been found in the excavation which was carried down to 4 feet below the present bed of the River Stort into the solid peat, for the foundation of a pier-wall in widening the bridge at the side of the old Town Mill. These are supplemented by remains from Braintree collected by the

* Proceedings Cambridge Philosophical Society, p. 256, 1913.

Rev. J. W. Kenworthy.' We are not quite sure what a 'Stortford-Grimaldi-Starnberg' type of horse is, but judging from the criticisms of Dr. Irving's previous 'discovery,' made by competent judges, it is probably of the modern 'gee-gee' variety.

THE 'FOSSIL HORSE' AGAIN.

In view of the alleged importance of the alleged prehistoric horse recorded by Dr. Irving at Bishops Stortford, the British Association appointed a Committee to visit the site, and report. This report was presented at Birmingham. The gentlemen who visited the site found it occupied by a lily-pond. A trial trench in an adjoining meadow was filled with water, and 'of the actual site there is at present no exposure, trench, or section of any kind.' The Committee apologise for the 'report,' and do not wish to be re-appointed! The work of the British Association, at times, almost resembles a farce.

PALÆOLITHIC 'GUILLOTINE' TRAP STONES.

Section H. of the British Association seems particularly partial to chestnuts. It will be remembered that in the Rev. F. Smith's extraordinary work on his alleged palæolithic implements, he described several very heavy stones which looked like implements, but which were obviously too heavy to handle.* He therefore invented the ingenious hypothesis that they were hung upon trees with cords, so that the wild animals passing underneath would break the cords and the stones would fall down and kill them. That remarkable statement was made to the world four years ago. The subject was again brought forward before Section H at the Birmingham meeting, in a paper with the above title. The stones 'are too large to have been used in the hand, but they will suggest in a variety of ways their intended purpose of being slung.' Several are over forty pounds in weight. Our sympathies are with the members who attended the lectures in Section H.

GAPING GHYLL.

Similarly, in Section E (Geography), Dr. Hill read a paper on 'Gaping Ghyll, Yorkshire: its Exploration and Survey.' He told us that it was partially descended in 1872, a complete descent was accomplished by Martel in 1895; in 1896 a Yorkshire Society went down; in 1903 it was again 'systematically explored,' and in 1906-7 a report thereon was published, and so on. But no new work appears to have been accomplished or recorded, and we presume the Geographical Section was satisfied with the ancient history of Gaping Ghyll!

STONE-BOILING IN THE BRITISH ISLES.

Mr. T. C. Cantrill pointed out that 'The process of boiling water by plunging into it a succession of red-hot stones was

* See review in *The Naturalist* for 1909, pp. 224-5.

in use among most of the northern tribes of North America when that continent first became known to European voyagers, and it survived among the Assiniboins and other primitive peoples down to the early nineteenth century. The boiling-vessel was a cauldron-shaped hole in the ground, lined with a raw hide; or a hide suspended like a hammock; or a large wooden box, trough, tub, or bowl; or a closely-woven basket of vegetable fibre. Captain Cook found the process in use among the Polynesian islanders, and other travellers have witnessed it, *e.g.*, among the New Zealanders in 1816; among the Esquimaux in 1826; in Australia in 1856; and also in Kamschatka and South America. A summary account of these extra-European methods was published in 1865 by E. B. Tylor, who pointed out that several limited applications of the principle in comparatively modern times had been recorded in Europe also, *viz.*, in the Hebrides by George Buchanan in 1528; in Ireland in 1600; in East Bothland by Linné in 1732; and in Carinthia by Morlot. Throughout the British Isles few ancient sites have been explored that have not yielded occasional burnt stones, which have no doubt rightly been regarded as pot-boilers, or as heaters employed in some form of oven. In Great Britain a growing volume of evidence supports the view that the practice of stone-boiling once ranged from the Shetlands to the English Channel.' It is of interest to remember that the late J. R. Mortimer found many such burnt stones in various sites on the wolds, and they are also recorded for Holderness.

THE INFLUENCE OF RIVER DEVELOPMENT ON PLANT-DISTRIBUTION.

Mr. A. R. Horwood read a paper on this subject in which he stated:—'Little attention has been drawn to the influence of rivers on plant dispersal. Primarily plants depend upon soil, altitude, and climate for their distribution or occurrence in natural plant formations. Now, in an area where the "solid" rocks are entirely or largely covered by glacial boulder clay, this development is of great importance, for if the streams had not cut their way down to the solid rocks below, and deposited alluvium, etc., in their course, the flora would have been much more uniform. The flora of the boulder clay is composite, and though certain differences can be noted between the different types it includes, it is, as a whole, commonplace. That of such a formation as the Lower Lias can be distinguished, and even made use of, to determine the junction between the outcrops of the two. The slope, aspect, and relative moisture, etc., imposed on a valley by river development have also all an effect on plant distribution.' The preceding seems to be a summary of fairly well-known

facts relating to plant distribution. His first sentence, however, is unnecessary and inaccurate.

PRESERVATION OF BRITISH FLORA.

Another of Mr. Horwood's 'contributions to science' deals with the disappearance of plants, not by hawking and collecting, but by droughts, drainage, cultivation, and golf links! We have known of rare plants being *eaten* by cattle. He suggests reservation. But we can assure Mr. Horwood that British botanists are fully alive to the causes of the disappearance of plants, many of which are not preventable. Everything Mr. Horwood suggests is being done and has been done for years. As Mr. Horwood asks for information and advice, we would suggest to him that he leaves the botanists to deal with botanical matters.

CONFERENCE OF DELEGATES.

Mr. Horwood read a paper on somewhat similar lines to the Conference of Delegates, and asked that the following resolution might be unanimously passed:—'That the time had arrived when the protection and preservation of wild plants demanded the attention of Parliament.' It was also moved that the Government be asked to appoint a Commission in regard to the matter, but this was negatived, one speaker stating that the appointment of a Commission would be a long and tedious affair.

BOTANICAL WORK IN YORKSHIRE.

Mr. T. Sheppard (Yorkshire Naturalists' Union) stated that he was not sure from what benighted parts of the country the various delegates present might have come, but he could assure them that in the north they were sufficiently civilized to look after their botanical treasures without Royal Commissions or other drastic measures being taken. The Yorkshire Naturalists' Union, with its forty affiliated Societies and nearly 4,000 members and associates, had for many years taken the greatest possible interest in the preservation of the flora and fauna of the county, some of the more interesting localities being protected by watchers paid from the Union's funds. Nor did they in Yorkshire find that serious harm was done, either by collectors or herbalists. After many years' work he felt that in Yorkshire, and surely in other parts of England as well, the various Societies were doing much more good in looking after their floral treasures than harm in collecting them. In fact he felt that the professional or amateur collector was an exceedingly rare individual, one reason being his difficulty in disposing of large quantities to advantage. He was sure that Yorkshire botanists would resent any action being taken which would interfere with the present very satisfactory state of things.

LANDOWNERS AND PLANTS.

He also resented interfering in any way with the landowners, either by making suggestions to them or by giving them additional powers. From many years' experience with landowners in all parts of Yorkshire, he had found that they invariably were only too willing to give every facility to Natural History Societies to roam over their estates, and he believed he was correct in saying that for very many years for which this privilege has been given to Yorkshire naturalists, (and on seven or eight occasions each year), he did not think there had been a single instance in which the privilege had been abused. He saw, in the suggested powers that it was proposed through Parliament to give, (providing the resolutions were passed), grave danger to this present state of things being interfered with. In other respects he considered that the suggestion now being made had already been adopted by many Societies many years ago.

He also, as representative of one of the largest societies in the country, resented the suggestion that all these various societies should come under the wing of the Selborne Society in this so-called protective scheme. He did not wish to deprecate in any way the excellent work the Selborne Society was doing, but he was sure that many societies whose delegates were present felt that they were able to continue the work they had been doing for many years without being connected with the Selborne or any other society of that kind. This opinion was supported by Mr. W. West and several other speakers, with the result that no steps whatever were taken in the matter by the Conference of Delegates, and Mr. Horwood's resolution fell through.

THE HANDBOOK.

The Handbook this year is unusually substantial and well prepared; being under the able editorship of Dr. G. A. Auden, F.S.A., in whose hands the Handbook for the York meeting was placed. Dr. Auden himself is responsible for the first chapter on the Pre-history of the neighbourhood. There are 150 pages devoted to natural science, the contributors being Messrs. G. S. West, W. B. Grove, J. Humphreys, E. Cleminshaw, J. B. Duncan, P. E. Martineau, R. W. Chase, H. W. Ellis, H. E. Forrest, H. W. H. Darlaston and A. Cresswell. Professor C. Lapworth contributes a magnificent account of 'The Birmingham Country: Its Geology and Physiography.' There is a good map and an admirable index. We do not like the dangerous red cover, and we certainly think the editor might have prevented the publishers from spoiling the title page with their imprint, which is in unnecessarily large type.

AN INNOVATION.

This year the various presidential addresses were ready for sale to the members as soon as they were delivered. These were bound in cloth covers of the familiar yellow-brown of the Annual Reports. The increased price was gladly paid. Seeing that the addresses and the various abstracts of papers, etc., can now be purchased during the meeting, and some in cloth, it seems incredible that the same material should take nearly a year to be indexed and issued as the Report of the Association. As it is each member can practically make up the report, for two or three shillings, at the meeting.

NEXT YEAR'S PRESIDENT OF THE BRITISH ASSOCIATION.

Professor William Bateson, M.A., F.R.S., who is to be next year's President, is a native of Whitby, and is a son of the Rev. Dr. W. H. Bateson, formerly Master of St. John's College, Cambridge. 'He was educated at Rugby School and St. John's College, of which he is Honorary Fellow. He was for a year at Yale University as Silliman Lecturer, and in 1908 became the first occupant of the Chair of Biology at Cambridge. Three years ago he received the honorary degree of D.Sc. at the University of Sheffield, and it was then truly said of him that he might almost be called the founder of an entirely new school of biological research. He was the first scientist to make a serious attempt to show the real bearing of the principle of discontinuity in variation upon the problem of evolution; and he was the first Englishman to recognize the true import of the almost forgotten theory of heredity that was put forward a generation ago by Mendel. Mr. Bateson and his coadjutors have succeeded in accumulating a mass of experimental evidence of the truth of Mendel's Law, and have thereby probably placed us on the threshold of a new epoch in our knowledge of organic evolution.'

A NEW FLORA OF YORKSHIRE.

We are pleased to announce the appearance shortly of a new Flora of Yorkshire, by Mr. F. Arnold Lees, M.R.C.S. It will be 'on the lines of the Botanical Survey, using the three variously up-to-date Floras (Baker's, Lees's, and Robinson's) as a foundation, a worthier format, and a much wider dissemination than would otherwise be possible. Its subject—essentially an analysis of the wild vegetation of England's largest and most vari-surface county—is one that has bearings upon, and is applicable in its factual incidences to, many of the still larger island areas of the Temperate Zones. No source of science delving into facts of the past has been neglected. The question of "fossil" seeds in earthy deposits, ancient or more recent, as well as sea-bed dredgings, etc., etc., which might throw light upon the origins, and

persistings or passings of its floral features from century to century, has been systematically "gone into," and made the basis of a classification which departs widely from the worn useless one of "Natives," "Colonists," and "Aliens" (for all plants must, at some beginning have been the last at first, even if the first at last in a usefully tentative view), while the authorities for all assimilated lemmas of nationale will be found fully acknowledged.' The volume will contain about five hundred pages, and subscribers will be able to secure it at 12s. 6d. net per copy. After publication the price will be 16s. net. In order to ensure its prompt publication we trust our readers will fill in the order form sent with this number. Further copies of the Prospectus will be gladly sent by the publishers of *The Naturalist*.

—:o:—

Cleveland Neuroptera and Trichoptera.—In connection with the recent meeting of the Yorkshire Naturalists' Union at Great Ayton, Mr. T. A. Lofthouse, Mr. Samuel Walker and I spent the week-end, August 2nd to 5th at Kildale-in-Cleveland. My own work was almost entirely among the Neuroptera and Trichoptera, and I was greatly assisted by Mr. Lofthouse. Of the twenty-one species taken, eight belonged to the genus *Hemerobius* out of eighteen recognized as British, showing that these insects must be well represented in the district. The interesting *Hemerobius orotypus* was abundant among conifers, and the pretty *H. marginatus* was also common among other trees, but away from the pines and firs. *H. atrifrons* was secured by Mr. Lofthouse, singly as usual. It is curious that this species seems to be always taken singly—or at most a couple. I only remember, indeed, one occasion on which I took a couple of specimens on the same day, and they both came out of the same bush in Wharnccliffe Woods; and such is apparently the experience of neuropterists throughout the country. Most of the other species of the genus can usually be found in numbers when they occur at all. The most interesting Trichopteron was the neat *Leptocerus bilineatus* which was fairly common both at Kildale and Great Ayton. The list is as follows:—

NEUROPTERA.	TRICHOPTERA.
<i>Chrysopa flava</i> .	<i>Glyptotaelius pellucidus</i> .
" <i>flavifrons</i> .	<i>Limnophilus centralis</i> .
<i>Hemerobius orotypus</i> .	" <i>auricula</i> .
" <i>marginatus</i> .	" <i>griseus</i> .
" <i>quadrifasciatus</i> .	" <i>sparsus</i> .
" <i>subnebulosus</i> .	<i>Silo pallipes</i> .
" <i>micans</i> .	<i>Leptocerus bilineatus</i> .
" <i>lutescens</i> .	<i>Hydropsyche instabilis</i> .
" <i>stigma (limbatus)</i> .	<i>Polycentropus flavomaculatus</i> .
" <i>atrifrons</i> .	The last at Great Ayton only.
<i>Leuctra klapaleki</i> .	

GEO. T. PORRITT, Huddersfield, September 3rd, 1913.

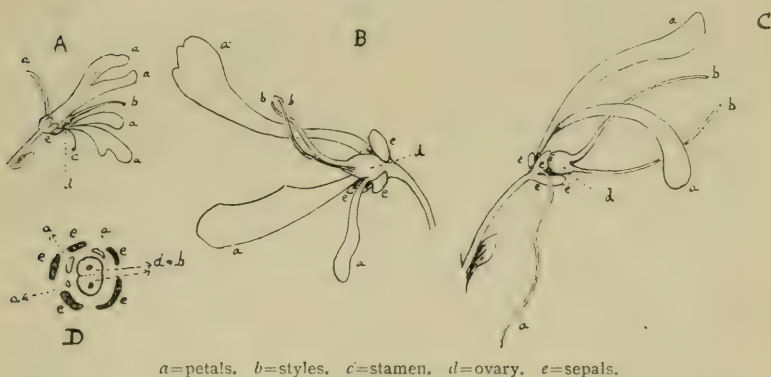
ABNORMALITY IN FOXGLOVE.

HAROLD J. BURKILL, M.A., F.R.G.S.

THE abnormal specimen of *Digitalis purpurea* described by Miss Poulton in the last issue of *The Naturalist* prompted me to look up my notes on a similar find from near Hackness, Scarborough, found on 27th August, 1902.

The plant was forty-two inches in height, growing in an exposed situation at the edge of a large heather moor. There were other Foxgloves near to it, but all these were normal plants. The upper portion of the plant was extremely abnormal, and contained nine immature buds at the tip of the stalk, then twenty-four flowers which were irregular throughout and no two alike except in the number of parts displaying abnormal tendencies.

The sepals varied in number, size, and position round the



flower. Sometimes there were only two or three, but never more than five.

The corolla was split into petals of various shapes and sizes, some being more like cotton threads, while the width of the largest one was nine-sixteenths of an inch. They varied in number from two to four, and were sometimes cut into lobes at the tip, a few of them being somewhat deeply notched. Their position round the ovary was also very irregular, sometimes all the petals being on one side of the flower-head.

The ovary ended in some flowers in two points (as in B and C), while one was treble, each point having its own style.

The flowers were mostly without stamens, but some of them had one (as in A).

The colour of the petals was slightly darker than the normal colour of the type plant.

The figure D shows the position and relative sizes of sepals and petals in a cross section through the flower C.

The abnormal flowers extended for seven and a half inches down the stem of the plant, below which point the flowers were all of the usual or normal type.

Some of the aborted flowers were dissected, teased out, and examined under the microscope. In each case they were densely inhabited by *Phytoptus*, which probably caused the abortion. It would be interesting to know if the plant described by Miss Poulton was examined for mites.*

In her specimen the abnormality seems to have taken the form of increasing the various parts of the flowers, while in the Hackness plant there was a larger amount of suppression than of increased development except as regards the ovaries and styles.

I have visited the locality at various times since, but all the foxgloves to be seen there were quite normal. A similar specimen was described to me from the Hog's Back, Surrey, in 1903.

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Poems of Henrietta A. Huxley with three of Thomas Henry Huxley, London, Duckworth and Co., 1913, pp. 158. In this little book Mrs. Huxley has brought together many of her poems, dealing with varying subjects and in varying ways. Many of them beautifully reflect her thoughts as lover, mother, widow. There are also three poems by the late Prof. Huxley.

Hull Museum Guides. As evidence of the popularity of cheap illustrated museum guides, the penny guides to the Hull museum have recently had to be reprinted; and on account of the alterations and additions which are constantly being made, they have had to be very largely re-written. The Guide to the Museum of Fisheries and Shipping, Pickering Park (Publication No. 87), which was only opened a short time ago, has reached its second edition. The Guide to the Museum of Archaeology and Natural History, Albion Street (Publication No. 40) has reached its fourth edition, as has also the Guide to the Wilberforce Historical Museum, High Street (Publication No. 41).

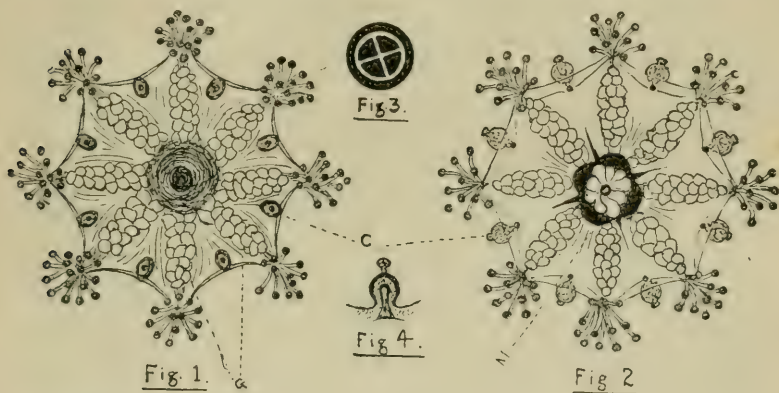
From the Cambridge University Press we have recently received three of their admirable shilling 'Manuals of Science and Literature.' **Bees and Wasps**, by O. H. Latter, M.A., deals with the Digger Wasps, double-winged wasps, flower-loving bees, long-pointed-tongued bees, social bees, structural features (sting, 'tongue,' etc.), and collecting and preserving bees and wasps. The illustrations are not quite up to the usual standard: **The Wanderings of Animals**, by Hans Gadow, F.R.S., is also a fascinating volume. 'These outlines of the distribution of animals deal with a rather young branch of science. An attempt has therefore been made to sketch its rapid growth from small beginnings until it has become boundless, because the interpretation of at first seemingly simple facts in the domain of the zoologist, has soon to enlist the help of well nigh all the other branches of Natural Science. The subject of geographical distribution is the dispersal of life, the greatest mystery of all, in space and time.' There are many helpful charts in this book. **Submerged Forests**, by Clement Reid, F.R.S. Probably no one is better able to deal with this interesting phase in the geological history of our islands than is Mr. Reid. He refers to the evidences afforded by the peat beds, etc., so far as they relate to changes in level, climatic changes, and geological and botanical problems. The recent discoveries on the Dogger Bank have enabled him to add an interesting chapter dealing with the former appearance of the North Sea.

* The specimen described by Miss Poulton (*Nat.*, Sept. 1913, pp. 315-318) was not attacked by mites.

HALICLYSTUS AT SCARBOROUGH.

JOHN IRVING, M.D.,
Scarborough.

THE unexpected has happened, and another marine record for the Yorkshire coast is added to our lists. It is an important one, for *Haliclystus octoradiatus* nominally belongs to the South. In the final paragraph of a short article on *Lucernaria campanulata* (*Naturalist*, July, 1913), I mentioned the absence of *Zostera* grass as a reason why *Haliclystus*, the common lucernarian of the English Channel, was not found at Scarborough. That statement holds good no longer, for since July, many young



Haliclystus octoradiatus.

Fig. 1.—Diagram (aboral view): (C) colieto-cystophores, (G) genital bands.

Fig. 2.—Diagram (oral view): (C) colieto-cystophores, (M) mouth.

Fig. 3.—Diagram of end of stomodæum.

Fig. 4.—Diagram of section of colieto-cystophore.

forms, adhering to Red *Ceramium*, have appeared in two distinct South Bay areas. Not a single adult, however, has been discovered. The natural inference is that adults are, or have been, in the vicinity, probably at some lower level where *Zostera* may be hidden, and that, subsequent to spawning, their progeny have been driven shorewards into sunnier and warmer tidal sand pools containing appropriate weeds for anchorage. *Ceramium* is often associated with *Zostera*, and in this connection the young of *Haliclystus*, initially, may be more at home on slender *Ceramium* filaments than on broad *Zostera* blades.

Messrs. Walmsley and Wilson, of the Marine Laboratory, found young specimens of *Haliclystus* on *Ceramium* in Robin

Hood's Bay, during August, and report the capture of an adult *Lucernaria* on *Ulva* by dredge.

Very few specimens of *Lucernaria campanulata* continue in evidence at Scarborough, and these have lost the white egg masses which were so conspicuous in May. Unfortunately the process of spawning and hatching was not seen, but as the result young lucernarians are now abundant in the same region, invariably, as their parents were, attached to *Halidrys siliquosa*.

It is curious that the young of *Lucernaria*, and the young of *Halicyllus*, whose habits are to all intents and purposes the same, and whose food supply is identical, should exhibit well marked preference for dissimilar weeds so that, without examining the animals, one can positively determine the species by the weed which supports it. What instinct causes *Lucernaria* to select *Halidrys*, and *Halicyllus*, *Ceramium*? Is there some inherent colour sense that guides aright? Both species are carnivorous, hence the plants chosen are simply protective supports, not food. Why *Halicyllus* in later life should transfer itself from red *Ceramium* to green *Zostera* is a colour problem. One thing is certain, the tints, varying from green to red and brown, which characterize the young, harmonise perfectly with a *Ceramium* environment, and render detection improbable, save in good light to a trained eye.

Two diagrams, based on photo-micrographs, of a very young *Halicyllus*, $\frac{3}{16}$ inch in diameter when fully expanded, afford details for comparison with sketches of *Lucernaria* given in the July *Naturalist*. The creature had been under observation, in a glass cell containing sea-water, for some weeks, and as it had fixed its disc to the centre of the glass bottom it provided an unusual object for microscopic study. Its essential movements corresponded precisely with those of *Lucernaria*, confirming the impression that lucernarians are much more akin to actinozoa than to medusæ. An anæsthetic, sufficiently powerful to suspend movement and sensation without causing an organism to alter its life-like appearance, is useful in elucidating anatomical detail. Chloretone, 5 grains, in an ounce of distilled, or cold boiled water, answers best. If the dose administered is neither too large, nor too prolonged, delicate creatures, when transferred to fresh sea-water, soon recover from its effect. Chloretone, too, may be employed advantageously in heavier dose, as a preliminary to preservation with formalin, to ensure specimens being fixed permanently in a natural condition for Museum purposes. Under microscopic observation, the selected *Halicyllus*, covered with a minimum of sea-water, was given clear chloretone solution through a pipette, drop by drop, until the whole surface of its bell, and all its tentacles, were at rest. Suddenly a final, but unlooked

for, movement shot out the gullet, or stomodæum, in an upward direction, just as some marine worms, under similar circumstances, extrude their probosces as a protest against physic. The mouth was but the puckerings of an inverted muscular tube, which, when everted, ceased to be. Thus transformed it was a straight cylinder, exhibiting four longitudinal muscle bands, whose upper extremity, when brought into focus (Fig. 3), was a circle divided into quadrants by two septa crossed at right angles. The length of this cylinder was equal to half the diameter of the expanded bell mouth. In the first issue of the *Jersey Marine Journal* (November, 1893), the late James Hornell had an illustrated article on *Haliclystus* in which he, a most careful student, erroneously assumed the mouth of this animal to be square and fixed. It is not square but irregularly rugose, appearing more or less angular owing to four equidistant muscles pulling downwards from opposite points of insertion. Motility of mouth and eversion of stomodæum are in accord with phenomena seen in actinozoa.

Haliclystus octoradiatus is easily distinguished by the presence of eight colieto-cystophores, which are non-existent in *Lucernaria*. The peculiar situation and shape of these organs are noteworthy. They are placed on the outer surface of the bell, just below, and in the centre of, the bay margins. Each penetrates its pedicle to the inner wall nearly at right angles to the tentacular processes. Seen from without (aboral, Fig. 1), the organ is a large oval, supporting a diminutive capitate tentacle. Viewed from within (oral, Fig. 2), it is globose with a projecting nipple. When the bell is fully closed, by the concerted action of all the tentacles, these eight colieto-cystophores assume the perpendicular, form a circular body-guard of sentinels, and, their short capitate nipples being charged with nematocysts, serve, presumably, to defend the organism against alien invasion while the general army of tentacles are otherwise engaged. To regard them as vestigial, like the human appendix, as some writers do, seems incredible considering their size, equipment, and anatomical disposition.

Genital bands in *Haliclystus* form eight separate rows occupying tentacular radii; in *Lucernaria* they are in pairs situated in alternate bays. In *Haliclystus* the clusters of tentacles are spread out, whereas in *Lucernaria* they are close set claw-like tufts.

Mr. S. L. Mosley, in one of the pages 10 of his monthly magazine, informs us that the Leeds Museum 'is overcrowded, largely due to the duplication of specimens. We noticed at least four Swallow-tailed Kites and half a dozen Snowy Owls. Such duplication is unnecessary in any public museum, and sets a bad example in the destruction of life.' It would be interesting to hear Mr. Crowther's opinion on the Sales Department of the Huddersfield Museum.

VARIATION IN THE LEAVES AND FLOWERS OF GOLDBLOCKS.

PROF. F. E. WEISS, D.Sc.,
The University, Manchester.

I HAVE read with interest the article by Mr. Winter on Variation in the Leaves and Flowers of Goldilocks (*Ranunculus auricomus*).^{*} I had noticed the occurrence of such variation some years ago in Miller's Dale, Derbyshire, where this plant is very plentiful, and have had some of the types under observation in the garden and in a cool house since then with a view to determining what variation is shown in the offspring of these forms. So far as the evidence goes it seems to point to each form breeding true when self-pollinated and prevented from crossing. The number of individuals I have raised, however, is not sufficient to warrant any definite statement, nor will I put forward as yet any explanation of the observed facts. I should like, however, to point out an interesting correlation to which, I think, Mr. Winter has not drawn attention. All the apetalous forms are characterized by the possession of leaves of the type 130, that is, with very few indentations, whereas the plants with five petals have the leaves very much dissected. Forms with two and three petals have a somewhat intermediate type of leaf, the segments being broader than in plants possessing five petals. I hope to continue my investigations on this interesting plant.

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The Peregrine Falcon at the Eyrie. By Francis Heatherley, London. 'Country Life,' Ltd., 78 pp., 5s. Many of the readers of *The Naturalist* have already had an opportunity of hearing something about the thirteen days' constant observation of a pair of peregrines, by Dr. Heatherley and his friends, who were able to live in a specially built hut at a distance of a few feet from the nest. The whole narrative is now pleasantly told, and is a distinct contribution to our knowledge of the life of this interesting species. Mr. H. B. Booth was one of the watchers, and spent his birthday there. His notes are included in the volume, and Dr. Heatherley, who evidently knows something, 'did not think it tactful to allow him to revise his rough notes.' The volume, which is exceedingly well produced, is illustrated by a series of photographs alone worth more than the cost of the book. The volume is dedicated 'to all egg collectors in the hope that some day they will realise that the shell is not the most important part of a bird's egg.' As a collector of eggs in a small way (one for breakfast each morning) the present writer agrees. We are permitted to reproduce one of the smaller illustrations (see Plate XVII.).

^{*} *The Naturalist*, Aug. 1913, pp. 283-286.



Peregrine Falcons two days old.

THE KELLAWAYS ROCK OF SOUTH CAVE, EAST YORKSHIRE.

GEORGE SHEPPARD, F.G.S.

THE Kellaways Rock of South Cave is essentially a ferruginous sandstone weathering to a rusty brown colour throughout the greater part of its development. Occasional lighter coloured patches occur at intervals, while a line of nodules (locally known as Doggers) occurs towards the base of the section. These are usually spheroidal in shape and are conspicuous features of the deposit as they weather out boldly from the adjoining parent rock. Fossils are numerous in the rock, but principally in the light-coloured patches.

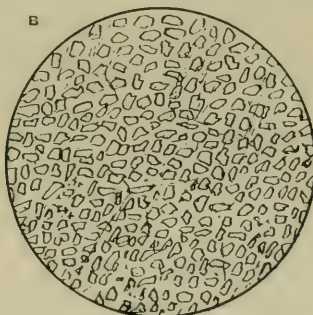
Casts of fossils are numerous throughout the softer rock and comprise *Ostrea*, *Gryphoea*, *Pinna*, etc. In the 'Doggers,'



A.—Ordinary type of Sandstone passing into a lighter patch (towards bottom of field).

Loose grains of quartz in a ferruginous (opaque) or calcareous matrix.

Section through Brachiopod shell towards the right.



B.—Section through rock constituting a Dogger. Small angular fragments of quartz in close proximity set in a matrix of calcite, which exhibits 'lustre mottling.' Under polarised light the mosaic of calcite can be seen enveloping the quartz element of the rock.

however, organic traces are practically absent. From a petrological point of view there are three types of rock present in the Kellaways. First, the soft upper sandstone; second, the harder patches contained therein, and third, the Doggers.

The predominant type (the soft sandstone) is a true ferruginous grit of a rusty brown colour. It crumbles easily and is composed of medium sized sand grains ($\cdot 06$ inch). Apparently the red oxide of iron is the cementing medium, but a certain proportion of carbonate of lime is always present and varies considerably in quantity as the rock passes through its different stages. In the lighter patches, for example, the white colour itself is due to the presence of carbonate of lime which occurs almost to the exclusion of the ferric oxide.

The transition from the red sandstone to the white calcareous type is sometimes abrupt, yet such a change is characterised by a suite of either Ammonites or Rhynchonellæ which have been perfectly preserved. In many cases compact 'pockets' of Rhynchonellæ, for example, are found constituting the nucleus of the lighter coloured patch. Probably the organic acids generated by the decomposition of such a collection of animal matter in the first case had accelerated the process of cementation and assisted in the accretion of calcium carbonate.

Microscopically, the sandstone consists of grains of quartz, some of which are well rounded, while the remainder are of a sub-angular variety. Sharp outlines of the quartz crystals are not common, suggesting that all had been subjected to a certain amount of secondary denudation before the ultimate consolidation took place. Comparing with the other types of the same rock the constituent grains are loosely arranged in a brown matrix of oxide of iron and lime carbonate. In the lighter patches the percentages of iron diminishes and is replaced by a mosaic of calcite. Hence from a microscopical point of view the only important difference between the ordinary sandstone and its associated lighter variation is that in the former type brown or opaque oxide forms the matrix to the exclusion of calcareous shells, while in the latter calcite replaces iron oxide, and occasional well-defined sections of bi-valve shells occur.

Other minerals noticed were—orthoclase, plagioclase, microcline, biotite, calcite, limonite and rutile.

The quartz grains are usually traversed by strings of inclusions (*e.g.*, in the Millstone Grit) and, where fractured, the crack has been filled in by the oxide of iron. The corroded edges of several of the quartz grain suggest the type so prevalent in certain of the rhyolites and felsites. Needles of rutile were also present in occasional quartz grains. The orthoclase, a rare constituent, was of a turbid nature and the edges were largely corroded and in an advanced state of chemical decomposition.

Plagioclase (of the Albite type) occurred, though in a clouded state. One feature of the section, however, was the occurrence of microcline, which appeared to be quite fresh and shewed no evidence of deterioration. The characteristic 'cross-hatching' was particularly well-defined under crossed Nicols. Under a high power very small globules of iron oxide were observed enclosed in the calcite crystal. The only other mineral of importance was a pseudomorph of augite which was largely chloritised; sufficient of the original crystal, however, was left to shew its cleavage.

In the Doggers there are several distinct and interesting

differences. The concretions themselves almost defy all attempts at fracturing even with a heavy sledge hammer. They consist of a light, grey, compact sandstone, the constituent grains being so small as to be indistinguishable to the naked eye. It presents a sugary fracture and has almost a quartzitic nature.

If a piece of the broken rock be turned in the hand, various glancing surfaces of fairly large size are at once conspicuous and are typical examples of 'lustre-mottling.' Occasional discolorations of brown oxide occur, but are extremely rare in a true 'Dogger.' The matrix of these concretions consists of much finer particles of sand. Organic traces are rare in a true concretion of the Dogger type.

Considered microscopically, a typical section presents a compact aggregation of angular quartz fragments of a very small and uniform size. They possess a definite arrangement in the matrix, and appear to have a regularity which is quite absent in the previous type. Iron traces are scarce and the grains are so closely packed together that the matrix is difficult to make out under ordinary light. Under crossed Nicols, however, a different interpretation is presented. The whole section practically consists of a series of calcite crystals which have enveloped the constituent sand grains. Whole patches of calcite, giving brilliant series of high polarisation tints, are observed enclosing the sand particles after the manner of the well-known Fontainebleu Sandstone. Thus a pure calcitic matrix has been formed and partially re-crystallised into a mosaic of prisms. This explains the glancing effect observed in the fractured hand specimen, and the peculiar 'lustre mottling.' In addition to the quartz and calcite, other minerals observed were felspar and biotite, both of which were in a decomposed state. Specks of green chloritic material were also noticed but these may have originally been flakes of mica which had suffered alteration. Tourmaline is present in the sandstone, though only a solitary fragment was seen.

Probably the Doggers themselves are due to pockets or accumulations of fine material which bear a certain relation to the underlying Kellaways sand of the same section.

It has been assumed that the predominant dark colour of the Liassic clays is the result of the denudation of great areas of the Coal Measures which persisted during the deposition of the Lower Jurassic strata.

Similarly, would not the denudation of the Millstone Grit in Jurassic time result in a deposit similar to that of the Kellaways Rock? Comparing the respective natures and characteristics of both the Millstone Grit and the Kellaways Rock, the latter presents a type such as would be expected from the denudation and subsequent deposition of the former.

PUPA SECALE IN CUMBERLAND.

W. DENISON ROEBUCK, F.L.S.

THE Rev. W. Wright Mason, B.A., Rector of Melmerby, Cumberland, has sent me a number of specimens of *Pupa secale* which he found on the 14th August in a disused quarry just under Melmerby Low Scar, which faces west, at 1,600 feet altitude. It was in company with *Pupa cylindracea*, *Cochlicopa lubrica*, *Pyramidula rupestris*, *Hygromia hispida*, *Helix nemoralis*, *Helicigona arbustorum* (a number of exceedingly young examples), and *Hyalinia cellaria*. Melmerby Scars are Carboniferous Limestone, and form part of the western slope of the Pennines, which a few miles further south culminate on Cross Fell.

This record is practically a new one, and is certainly the first indisputably Cumberland record which has come under my notice. Miss Jane Donald (now Mrs. G. B. Longstaff), in her Cumberland lists of 1882 and 1885, mentioned that she had never met with this species in Cumberland, although its occurrence in the neighbouring county of Westmorland was well known.

Last year Mr. J. Wilfrid Jackson, F.G.S., of the Geological Department of the Manchester Museum, sent me a few specimens which he had detected in an old collection, labelled 'Penrith' without evidence of any more precise localization. On the strength of these examples, I noted the species as a new one for Cumberland, but Mr. J. Davy Dean, of Lancaster, suggested to me that the record was uncertain as regards the county, and was just as likely to be Westmorland as Cumberland, Penrith being close to the border-line, and old records being notoriously far from precise. Mr. Dean tells me that he knows the district well, and had never seen the species anywhere near that town, the geological formations there being nearly all sandstone.

As regards the country east of Penrith this is quite accurate, but the Mountain Limestone comes quite close up on the west, in which direction Mr. Jackson points out that there are various likely quarries in this limestone area near such places as Little Blencow, Johnby, Skelton, etc., which might possibly repay careful investigation for this species. So might other of the scars on the main Cross Fell range, particularly on that mountain itself.

Mr. Mason's discovery, however, entirely sets at rest any question as to the existence of the species in Cumberland, and the place in which he has taken it is the most northerly point in Britain in which it has been observed. True it is, that there is a record by Captain Laskey, published so long

ago as 1811, as follows :—‘ Upon a hill at Dunbar [Haddingtonshire], rare.’ This has, however, never been confirmed or corroborated by any subsequent conchologist.

The range of the species in these islands is entirely confined to England. It is widely scattered in isolated localities, ranging in altitude from the limestone scars of the Pennine range at 1,600 feet and over, down to about a hundred feet in the Brigg district of North Lincolnshire, where it has been taken exceedingly sparingly by Mr. John Beaulah.

I have had properly authenticated records for twenty-four counties and vice-counties, viz., Cumberland, Westmorland-with-Lake-Lancashire, Yorks. N.W., Yorks. Mid.W., Derbyshire, Lincoln North, Lincoln South, Herefordshire, Monmouthshire, Gloucester East, Gloucester West, Oxfordshire, Buckinghamshire, Hertfordshire, Kent East, Sussex East, Sussex West, Isle of Wight, Dorsetshire, Wilts South, Somerset North, Devon South, Cornwall West, and a ‘ Winchester ’ record which is referable either to Hants North or Hants South.

Besides these, I have seen published records for a few other counties or vice-counties in England and one in Wales, some of which are uncertain or doubtful, and all need confirmation by authentication, and I shall feel very grateful to any reader of this note who would be good enough to put me in the way of being able to submit examples of the species from any county not mentioned above.

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Wild Flower Preservation, by May Coley. London : T. Fisher Unwin [1913], pp. 191, 29 plates, 3s. 6d. net. This little book is written by an enthusiastic flower lover, who is anxious to whet the appetites of beginners in the beauties of plants and the many interesting aspects of their study. She rightly emphasises the importance of the careful study of a few plants at a time rather than the hurry to make a large herbarium of badly dried and labelled specimens. ‘ The glib repetition of Latin names, of plant organs and their numbers never made a botanist—though it has often made a bore ! ’ The suggestions given on keeping a nature note-book are good, and if followed will prove interesting and profitable to the young collector of plants. There are useful chapters on gathering, identification, pressing and mounting of plants, all pleasantly written, and a well illustrated glossary of botanical terms.

The Theory and Practice of Working Plans, by A. B. Recknagel. London : Chapman & Hall, pp. xii. and 235, 8s. 6d. net. This work, by the Professor of Forestry in Cornell University, will be better recognized by its sub-title, ‘ Forest Organization,’ a subject which has been actively engaging the attention of American foresters during recent years. The object of the book is to bring together for the benefit of American foresters, the best methods of organization with a view to greater output and economy. The first part of the volume deals in a clear and concise manner with the aims and methods of working plans and is illustrated by excellent photographs, a sketch map and tables. In the second part the author details the chief methods followed in Europe, where he has spent a year in their study. Accounts are given of forest management in the following German states :— Prussia, Bavaria, Saxony, Württemberg, Baden and Alsace-Lorraine, and sections are also devoted to the forests of France and Austria.

MARINE BIOLOGY AT FILEY.

 REV. F. H. WOODS, B.D.

It is now ten years since the Yorkshire Naturalists met at Filey, and a comparison of the list of finds then obtained, which was drawn up by Mr. Petch, is extremely interesting. It so happened that the principal attention was then paid to *Hydrozoa* and *Polyzoa* and the lower forms of *Crustacea*, while the shell molluscs, especially the microscopic forms were comparatively neglected. If the two lists are added together they will form a fairly comprehensive list of the marine fauna at Filey. To these we should add to the shell molluscs, *Brachystomia albella*, *Stilifer turtoni* mentioned by Jeffreys and *Cæcum glabrum* and *Cochlodesma prætenue* found there by myself. In spite of a rather unfavourable tide on Saturday and bad weather on Monday, the investigations were on the whole highly satisfactory. The Spittal proved particularly rich in specimens of compound ascidians—the patches being large and thick. The number of *Polyceræ* and *Goniodoris* on the under sides of even small stones was phenomenal. One singular feature was the enormous multiplication of *Sagartia miniata*, the curious little scarlet-fringed anemone, which bids fair to rival the ubiquitous common beadlet found at the higher levels. Several of the microscopic shells were extremely interesting. Two specimens of *Brachystomia rissoides*, in a living state, were found on the Brig as also living specimens of the cowry and *Anomia patelliformis*. In shell sand I found a fragment of *Philine angulata*. I had so identified a fragment found some years ago at Scarborough, but having lost it before I had confirmed it I did not record it. It does not appear to have been otherwise recorded on the Yorkshire coast. Among other interesting shells may be mentioned *Ondina obliqua*, which I have found also at Scarborough, Robin Hood's Bay and Cayton Bay. *Setia obtusa* (*Rissoa soluta*) and *Homalogyra atomus*, both of which I have found at Scarborough only. Among the crustaceans the most interesting specimen was the hairy crab, *Pilumnus hirtellus*, a common species on the West Coast, and also occurring on the Irish coast, usually in deep water but not, it appears, found before on the Yorkshire Coast.

The following list was drawn up by Dr. Irving, Mr. Clarke, and myself. Mr. Clarke is responsible for the fish and larger *Crustacea*, myself for the shell-molluscs, and Dr. Irving for the rest.* With the exception of most of the shell-molluscs (see note) and the crab *Portunus marmoratus*, of which a single claw was found washed up, all specimens were found in a living state:—

PORIFERA.

Grantia compressa.
Leucosolenia botryoides.
Sycandra ciliata.
Chalina oculata.
Halichondria panicea.
Halisarca sp.

HYDROZOA.

Campanularia flexuosa.
Obelia geniculata.
Plumularia setacea.
Sertularia pumila.
S. falcata.
Tubularia indivisa.

SCYPHOZOA.

Aurelia aurita.

ACTINOZOA.

Actinia mesembryanthemum.
Sagartia miniata.
S. pura.
S. troglodytes.
Tealia crassicornis.
Alcyonium digitatum.

NEMERTEA.

Amphiporus lactifloreus.
Nemertes gracilis.

POLYCHÆTA.

Amphitrite gracilis.
Arenicola marina.
Audouinia tentaculata.
Cirratulus cirratus.
Eulalia viridis.
Evarne impar.
Harmothoe imbricata.
Lepidonotus clava.
L. squamatus.
Lagisca floccosa.
Lanice conchilega.
Nephtys cæca.
Nereis cultrifera.
N. fucata.
N. pelagica.
Nicomache lumbricalis.
Polycirrus aurantiacus.
Pomatoceros triqueter.
Potamilla reniformis.
Spirorbis nautiloides.
Syllis armillaris.

POLYZOA.

Alcyonidium gelatinosum.
A. hirsutum.
A. parasiticum.
Bicellaria ciliata.
Bugula flabellata.
B. turbinata.
Crisia eburnea.
Flustra foliacea.

Membranipora membranacea.
M. pilosa.
Pedicellina cernua.
Scrupocellaria reptans.

MOLLUSCA (shelled).

**Tonicella rubra.*
 **Craspedochilus cinereus.*
 **Acanthochites fascicularis.*
 †*Nucula nitida.*
 †*Nuculana minuta.*
 *†*Anomia ephippium.*
 **A. patelliformis.*
 **Mytilus edulis.*
 †*Modiolaria marmorata.*
 †*M. discrepans.*
 †*Pecten varius.*
 †*P. opercularis.*
 †*Palliolum tigrinum* (fragment,
Turtonia minuta.
 †*Astarte compressa.*
Cyprina islandica.
Montacuta bidentata.
Tellinomya ferruginosa.
 **Kellia suborbicularis.*
Lasæa rubra.
Syndosmya prismatica.
S. alba.
 **Tellina tenuis.*
T. fabula.
Macoma baltica.
Donax vittatus.
 **Mactra stultorum.*
 †*Spisula solida.*
Lutraria elliptica.
Dosinia exoleta.
D. lupina.
 **Venus gallina.*
 †*Tapes pullastra.*
 †*Cardium echinatum.*
C. edule.
 †*Gari ferroensis.*
 †*Cultellus pellucidus.*
Ensis siliqua.
 **Saxicava rugosa.*
 **S. arctica.*
 **Zirphæa crispata.*
 **Patella vulgata.*
 **Helcion pellucidum.*
 **H. pellucidum* v. *læve.*
 **Acmæa virginea.*
 **Eumargarita helicina.*
 **Gibbula cineraria.*
 **Lacuna crassior.*
 **L. divaricata.*
 **L. pallidula.*
 **Littorina obtusata.*
 **L. rudis.*
 **L. littorea.*
Rissoa parva.

- **Rissoa parva* var. *interrupta*.
 **Alvania punctura*.
Onoba striata.
Setia obtusa.
Cingula semistriata.
Paludestrina stagnalis.
Adeorbis subcarinatus (Cayton Bay).
Skenia planorbis.
Homalogyra atomus.
 **Trivia europæa*.
Natica catena.
N. alderi.
Cioniscus albidus.
Odostomia unidentata.
O. turrita.
Brachystomia rissoides.
Ondina obliqua.
Pyrgulina indistincta.
P. interstincta.
Spiralinella spiralis.
Turritella communis.
Buccinum undatum.
Neptunea antiqua.
Tritonofusus gracilis.
Ocenebra erinacea.
Purpura lapillus.
Bela turricula.
B. rufa.
 †*Clathurella linearis*.
Tornatina truncatula.
Diaphana hyalina.
Bullinella cylindracea.
Philine catena.
P. angulata (fragment).
P. punctata.
Limacina retroversa.

NUDIBRANCHIATA.

- Archidoris tuberculata*.
Aeolidia papillosa.
Goniodoris nodosa.
Jorunna johnstoni.
Lamellidoris aspera.
L. bilamellata.
Limapontia nigra.
Palio lessonii.
P. ocellata.
Polycera quadrilineata.

ASTEROIDEA.

- Asterias rubens*.
Cribella oculata.
Ophiocoma rosula.
Ophiura texturata.
O. alba.
Solaster papposus.

ECHINOIDEA.

- Echinus sphæra*.
E. miliaris.
Amphidotus cordatus (test only).

CRUSTACEA.

- Acheus cranchii*.
Balanus balanoides.
Carcinus mænas.
Cancer pagurus.
Crangon vulgaris.
Caprella tuberculata.
Eupagurus bernhardus.
Gammarus marinus.
Galathea squamifera.
G. strigosa.
Hippolyte varians.
Mysis chamæleon.
Orchestia littoralis.
Phoxichilus spinosus.
Pilumnus hirtellus.
Pinnotheres pisum.
Porcellana platycheles.
P. longicornis.
Portunus marmoratus.

TUNICATA.

- Ascidia mentula*.
Aplidium ficus.
Botryllus rubens.
B. schlosseri.
B. smaragdus.
B. violaceus.
Botrylloides albicans.
B. radiata.
B. rubra.
Styelopsis grossularia.

FISHES.

- Scomber scomber* (the Common Mackerel).
Cottus bubalis (the long-spined Sea Bull-head or Father-lasher.)
Trigla gurnardus (the Grey Gurnard).
Blennius pholis (the Shanny).
Centronotus gunellus (the Butter-fish or Spotted Gunnell).
Labrus maculatus (the Ballan Wrasse).
Gadus morrhua (the Common Cod).
G. merlangus (the Whiting).
G. pollachius (the Pollack).
G. virens (the Coalfish).

NOTE.—An asterisk (*) prefixed to a name signifies that the animal was found alive; a dagger (†) that it was only found in a very young state.

Pleuronectes platessa (the Plaice).
P. limanda (the Common Dab).
Clupea sprattus (the Sprat).
Trachinus vipera (the Lesser Weaver).

Zoarces viviparus (the Viviparous Blenny).
Lophius piscatorius (the Angler Fish).
Anguilla vulgaris (the Common Eel).

At a formal meeting of the Committee, it was decided to hold next year's meeting at Whitby at the nearest convenient spring tide to the autumnal equinox.

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The Journal of the Torquay Natural History Society (Vol. I., No. 5, 1913) contains a paper on 'The Making of Torbay,' by Mr. A. J. Jukes-Browne; some interesting notes on Human Remains from Kent's Cavern by Dr. Duckworth; Sand Wasps, by Mr. R. Stenton; Notes on William Pengelly (with portrait) by his daughter, Mrs. Forbes Julian; and Historical and National Plants, by Mr. G. Lee. There are also various reports.

The Annual Report and Transactions of the North Staffordshire Field Club for 1912-3 contains the address of the President, Mr. E. D. Bostock, on the Life Story of a Lepidopterous Insect. Mr. F. W. Ash writes on the Nature and Origin of Secondary Sex characters. Mr. A. R. Horwood considers 'The British Trias a Delta Formation.' There are papers of antiquarian interest, as well as reports on Zoology, Botany, Geology, Archaeology and meteorology. The editor, Mr. W. Wells Bladen, contributes Bird Notes for 1912.

The Transactions of the Hull Geological Society (Vol. VI., Part 3, 1913, pp. 175-222, price 1s.) are entirely devoted to 'A Catalogue of the Hull Geological Society's library and of the geological works in the Central Public Library, Albion Street, Hull.' It often happens that the usefulness of the libraries of local scientific Societies is curtailed because of the difficulty of obtaining the books. The Hull Society has surmounted this difficulty by lending its library to the Public Library, on condition that the books may be taken out by its members on ordinary terms, whereas the general public can consult them in the Reference Library only. Thus both the Society and the public benefit. The Catalogue—which of course is 'strong' on works dealing with Yorkshire geology—has been prepared on the Dewey Decimal System by the staff at the Public Library, and is printed by the Geological Society.

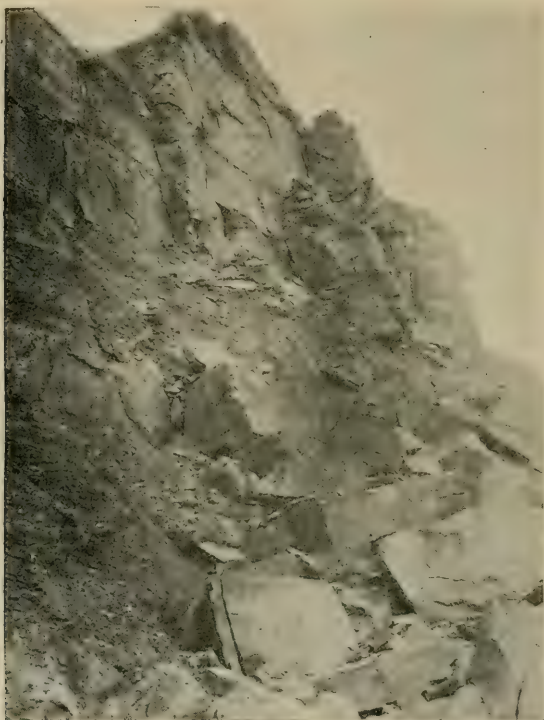
The Lincolnshire Naturalists' Union Transactions, 1912. Louth, 1913. Pp. 1-68. Under the editorship of Messrs. A. Smith and R. W. Goulding this publication continues to improve in appearance and increase in scientific value. In the present issue there is an account of a Past-President, Mr. H. Preston (with photo); Dr. W. Wallace gives his presidential address, on 'The Senses and Emotions of Insects'; there are reports on geology by Mr. Preston; Arachnida by Mr. Musham; Botany by the Rev. E. A. Woodruffe-Peacock; Conchology by Messrs. Roebuck and Musham; Entomology by Mr. Mason; Galls by Miss Stow; Vertebrata by Rev. F. L. Blathwayt. Messrs. Wallace and Thornley give their sixth list of Lincolnshire Beetles; Mr. Mason makes additions to the List of the county's Lepidoptera; and the Rev. Blathwayt supplies a useful List of Lincolnshire mammals. There are also shorter notes. The price is not stated, but presumably the part can be obtained for 1s. 6d. Neither the Volume nor the part are given, which is a pity, as the information would help bibliographers and also be useful in binding. Presumably it is Part 1 of Volume III. of the New Series of the Transactions.

GEOLOGICAL NOTES ON GREAT AYTON.

J. J. BURTON, F.G.S.

(PLATE XVIII.).

It is seldom the members of the Yorkshire Naturalists' Union have the opportunity of examining such a varied and interesting series of rocks and phenomena within a radius of about

*Photo by]**[Godfrey Bingley.*

Landslip at Roseberry Topping.

two miles as was afforded them on the occasion of their visit to this district.

The Great Cleveland Whin Dyke claimed most of their attention on one of the days. Arrangements had been made for those so inclined to inspect the workings of the Gribdale Mining Company, and many of the party availed themselves of the opportunity. The Dyke at this point is usually about eighty to ninety feet in width, but varies considerably.

Naturalist,



Photos by]

Landslip on Roseberry Topping.

[Godfrey Bingley.

The general effect is a wall of basaltic rock, but there are numerous varying details. Several places were pointed out where the miners had come upon unexpected 'troubles' (a very expressive local term), where instead of the rock being continuous it was suddenly interrupted by what have generally been found to be wedge-shaped masses of lias shale cutting right across the Dyke in some instances, and in others running in the Dyke longitudinally, splitting it into two apparently separate walls. The explanation offered was that when the intrusion occurred weak places in the lias strata allowed the liquid basalt to divide itself and follow two distinct courses upward, and that as the workings proceed downward the divided portions will probably be found to have one root. At one place it was pointed out the Dyke abruptly ended, and its continuation was found some distance away. This was considered to be only a variant of the transverse and longitudinal 'troubles' and due to the same causes.

Where the whole of the Dyke had been removed at the surface a huge, almost vertical slash had been cut into the hill, leaving the sides, chiefly composed of lias shales, clean and upstanding; and it was easy to observe the effect of the great lateral pressure which must have been experienced when the Dyke was formed. For a considerable distance (several yards) the cleavage, instead of being parallel to the bedding planes, was perpendicular thereto. Many of the shales also had been altered in character by the heat, and were known by the workmen as 'whiteback.'

Standing on the top of the Dyke, its course could easily be traced for several miles by its hog-back appearance. The hardness of the rock has no doubt preserved it from denudation more than has been the case with the lias shales on either side. The rock is described as an Augite-andesite, and is believed to be part of the great Tertiary eruption.

Another day was chiefly devoted to an examination of the the Estuarine beds of the Lower Oolite on the main escarpment, as well as on those near the top of Roseberry Topping. These latter are very remarkable, and have received a preliminary description by Mr. H. Hamshaw Thomas in a recent issue of *The Naturalist*. The evidence suggests that these plant beds are local so far as species are concerned, as quite a distinctive series of plants occur in profusion in one place and only very sparsely in another. On Roseberry Topping there is a bed of 'paper coal' composed of plant remains—largely *Thinnfeldia rhomboidalis*—and its abundance indicates a luxuriant vegetation, the decay of which was swept into shallow pools free from muddy intrusions.

Cuttings for mining purposes through the middle lias were examined, and several minor faults were noticed, as well as

a 'wash-out.' In the cutting, and also in the debris, fossils in profusion were found.

Glacial evidence was forthcoming in the shape of grooved blocks of stone in situ, recently uncovered, and also in many blocks which have been moved by a recent landslip.

The sand quarry at Ayton was visited, and many marine shells—some entire, but most in fragments—were obtained. Far-travelled erratics in abundance were also noticed.

Probably, however, the most extraordinary sight of the excursion was the enormous landslide on Roseberry Topping. The conical hill has split across the top as if it had been sliced by a knife, and the whole of the west face has bodily moved down the slope. The information given was that the slipping first commenced at the foot. The surface soil apparently rested on a stratum of soft yellow clay, and this again on a rock which had probably been smoothed by the passage of the ice sheet across the face of the hill. The smooth rock provided an excellent sliding plane, and the soft wet yellow clay a good lubricant for the surface soil and rock debris to slide to a lower level, and thus uncover the sandstone cap. This was found to rest on soft friable shales in which the plant remains were discovered. Once exposed to the weather the shales quickly disintegrated and left the hard cap undermined. As the process went on detached pieces of rock fell on the sliding mass and hastened its movement. The bottom of the slide now presents a perpendicular face of six to twelve feet high, and it is doubtful if it has come to rest.

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Photographic Supplement to Stanford's Geological Atlas of Great Britain and Ireland. By Horace B. Woodward, F.R.S., with the co-operation of Miss Hilda D. Sharpe, 113 pp., 4s. This is a collection of over a hundred reproductions of photographs of the principal geological features of the British Isles, and forms a fitting companion to the Geological Atlas which has already been referred to in these columns. There are two illustrations to a page, and each is accompanied by ten or a dozen lines of descriptive matter. The illustrations appear to have been chosen with care, though it came as a mild shock to us to find that Yorkshire was represented by one poor photograph of the rocks near Filey Brig, while a book of British geological photographs without a single print from the well-known camera of Mr. Godfrey Bingley seems almost unbelievable.

A Dictionary of English and Folk-Names of British Birds. By H. Kirke Swann. London: Witherby and Co., 1913, pp. xii+266, 10s. net. This extraordinarily useful book contains about five thousand names of British Birds, including (1) English Book-names, culled from past authors, from the earliest series in Turner on Birds (1544), Merrett's Pinax (1666), Charleton's Onomasticon Zoicon (1668), and Willughby & Ray's Ornithology (1678), as well as General English Literature; to Albin, Edwards, Pennant, Bewick, Mantagu, Latham, Macgillivray, Yarrell, etc., etc.; (2) Accepted names of the present day, with their history and first usage; (3) Provincial, Local, and Dialect Names, with their locality and meaning; (4) Welsh, Gaelic, Cornish and Irish names; (5) Folk-Lore, Weather-Lore, Legends, etc., connected with each bird. We have tried hard to find that some rare or little known name was omitted in this volume, without success.

NOTES ON THE BLUE-GREEN ALGÆ, WITH A KEY TO THE SPECIES OF OSCILLA- TORIA AND PHORMIDIUM.

HAROLD WAGER, F.R.S.

(Continued from page 337).

32. In fresh water; trichomes 6-8.5 mic. broad **P. tinctorium**
Stratum basifixed, elongate, waving,
dark green, yellowish purple when dried,
gelatinous; trichomes much constricted
at joints; apex straight, sometimes
tapering; apical cell conical, no calyptra;
cells 5-11 mic. long, transverse walls not
granulated. (G., 162, 4, 11; T., 94, 4, 55.)
33. Stratum incrustated with lime 38
33. Stratum not incrustated with lime 39
34. Trichomes 5.5-9 mic. broad, constricted at joints, **C. okeni**
Stratum dark blue-green; trichomes
tapering, curved or hooked; apical cell
obtuse, somewhat conical, not capitate;
no calyptra; cells 2.7-4.5 mic. long.
Brackish water. (G., 232, 7, 18; T., 81,
4, 35.)
34. Trichomes 8-13 mic. broad, slightly constricted
at joints **O. chalybea**
Stratum dark green; trichomes fragile,
straight or twisted in loose spirals; apex
tapering gradually, hooked or curved;
apical cell obtuse, not capitate, no calyptra;
cells 3.6-8 mic. long, trans. walls with few
or no granules. In fresh or brackish water.
(G., 232; T., 82, 4, 36.)
34. In salt water, epiphytic **O. corallinæ**
Trichomes forming a delicate coating
on larger algæ, long flexuous or contorted,
constricted at joints, curved gradually,
6-10 mic. in diameter, scarcely tapering;
cells 2.7-4 mic. long, transverse walls not
granular; apical cell slightly thickened,
somewhat capitate. On marine algæ. (G.,
218, 6, 21; T., 70, 4, 16.)
35. Stratum light blue-green, floating **O. agardhii**
Trichomes 4-6 mic. in diameter, straight,
fragile, not constricted at joints, tapering,
obtuse, capitate, calyptra convex; cells
2.5-3.5 mic. long; transverse walls granu-
lar. In fresh water. (G., 205; T., 62, 4, 2.)
35. Stratum purple or purple violet 40
36. Calyptra not present; membrane may be
slightly thickened 41
36. Calyptra present 42
37. Trichomes 5.5-8 mic. in diameter **O. cortiana**
Stratum dark blue-green; trichomes
straight, fragile, slightly constricted at
joints; apex curved, tapering, not capi-
tate; apical cell obtuse, no calyptra;

- cells 5.4-8.2 mic. long, transverse walls not granulated; apical cell may be 14 mic. long. In warm water. (G., 231; T., 81, 4, 34.)
37. Trichomes 2.5-4 mic. in diameter **O. numidica**
 Stratum dark blue-green; trichomes straight, fragile, constricted at joints; apex tapering, curved, not capitate, no calyptra, obtuse; cells 2-8 mic. long, transverse walls not granulated. Fresh water, on water plants, etc. (G., 231; T., 81.)
38. Transverse walls conspicuous **P. inerustatum**
 Stratum incrustated with lime, hard, dark red or violet; filaments 4.5 mic. in diameter, entangled, not constricted at joints; apex straight, obtuse conical; cells 3.5-5.2 mic. long. In streams, on sides of water troughs. (G., 170, 4, 27; T., 99, 4, 68.)
 Var. cataractum, in waterfalls, etc. (G., 190.)
38. Transverse walls hidden by granules 43
39. Cells longer than broad 44
39. Cells usually shorter than their diameter, or equal and shorter after division 45
40. Floating; cells 6-8 mic. in diameter, 2-4 mic. long **O. rubescens**
 Stratum purple-violet; trichomes straight, rigid, fragile, not constricted at joints; apex tapering, slightly capitate with convex calyptra; transverse walls frequently granular. (G., 204, 6, 6-7.)
40. Floating; cells 2.2-5 mic. in diameter, 4-6 mic. long **O. prolifica**
 Stratum purple, lilac when dry; trichomes straight, flexible, not constricted at joints; apex tapering, capitate; transverse walls frequently granular; apical cell truncate, calyptra depressed conical. On ponds forming a purple floating scum. (G., 205, 6, 8; T., 61, 4, 1.)
41. Cells 6-8 mic. in diameter, 1.5-2.5 mic. long **O. anguina**
 Stratum dark blue-green; trichomes not constricted at joints, inflated refringent cells present; apex tapering, twisted, in a spiral like a screw, obtuse, capitate; apical cell sometimes thickened. In streams and still water; on moist earth. (G., 214, 6, 16; T., 68, 4, 9.)
41. Cells 2-3 mic. in diameter, 3-9 mic. long **O. splendida**
 Stratum thin or scattered; trichomes blue-green, flexuose, elongate, not constricted at joints; apex tapering, capitate; apical cell globular; transverse walls slightly granular. In stagnant pools, brackish ditches; on mud, wet rocks. (G., 224, 7, 7, 8; T., 76, 4, 23, 24, 25.)
 Var. uncinata; apical cell very long, hooked. (T., 76.)

42. Cells 2.5-5 mic. in diameter, 2.5-4.2 mic. long **O. amœna**
 Stratum bluish-green or scattered;
 trichomes straight, flexible, slightly constricted at joints; apex tapering, capitate, hooked or undulate; apical cell with conical calyptra; transverse walls with fine granules. Hot springs and on rocks, trees, etc. (G., 225, 7, 9; T., 77, 4, 26.)
42. Cells 4-9 mic. in diameter, 2-6 mic. long, stratum dark green, expanded. 46
42. Stratum thin, cobweb-like, dark purple **P. setchellianum**
 Trichomes 4-4.8 mic. in diameter, straight, somewhat flexuous, not constricted at joints; apex slightly tapering, curved capitate; apical cell with depressed conical calyptra; cells 3-6 mic. long, transverse walls granular. In swiftly running water on stones. (G., 190, 5, 25, 26; T., 108, 5, 20-21.)
43. Sheath thin, becoming blue in chlor-zinc-iodide, **P. umbilicatum**
 Stratum indurated with lime, stone-like, mamilllose; trichomes 3-4 mic. in diameter, not constricted at joints; apex straight, tapering for very short distance, not capitate; cells 3-5 mic. long; apical cell obtuse, no calyptra. (G., 170.)
43. Sheath thick, lamellose, not becoming blue in chlor-zinc-iodide **P. toficola**
 Stratum indurated with lime, compact, very hard; trichomes 3-4.5 mic. in diameter, not constricted at joints; apex straight, tapering slightly, not capitate; cells 2.3-5 mic. long; apical cell conical, no calyptra. (G., 171, 4, 28-30.)
44. Transverse walls obscured by granules . . **P. inundatum**
 Stratum membranaceous, blue-green; trichomes straight or curved, not constricted; cells 3-5 mic. in diameter, 4-8 mic. long; apex straight, briefly tapering, not capitate; apical cell obtuse, conical. Margins of ditches, moist earth, dripping water. (G., 172, 4, 31-32; T., 100, 4, 69-70.)
44. Transverse walls usually conspicuous, not granulated **P. corium**
 Stratum membranaceous, leathery, dark blue-green or black; filaments elongate, not constricted at the joints, entangled; cells 3-4.5 mic. in diameter, 3-4.8 mic. long; apex straight, apical cell obtuse, conical. On stone-work and timber of mill-dams, in ponds, etc. (G., 172, 5, 1-2; T., 101, 4, 71-72.)
45. Sheath present, thin, blue in chlor-zinc-iodide . . **P. papyraceum**
 Stratum dark green, thin, leathery, fragile when dried, papyraceous, sometimes diffuent; filaments strongly flexuose, intricate; cells 3-5 mic. in diameter, 2-4 mic. long; apical cell attenuate, obtuse, conical. On timber in mill-dams, on

- rocks in rapid water, on moist walls of water troughs, etc. (G., 173, 5, 3-4; T., 100, 4, 73-74.)
45. Sheath absent 47
46. Apex of filaments curved or spiral .. **P. uncinatum**
 Stratum widely expanded, dark green to dusky or reddish black, adhering; thin, sometimes floating basifixed; filaments straight or subflexuous, verdigris or blue-green; cells 6-9 mic. in diameter, 2-6 mic. long, transverse walls frequently granular; sheath more or less distinct or amorphous; apex slightly attenuate, exceedingly capitate; apical cell with rounded or depressed conical calyptra. On rocks in cataracts and rapid streams, sometimes on the ground in pools filled with rain; very common. (G., 184, 5, 21, 22; T., 106, 5, 16, 17.)
46. Apex of filaments straight or slightly curved, **P. autumnale**
 Stratum expanded, fragile, dark green or sometimes yellowish or reddish-brown; filaments straight, rarely flexuous, entangled; sheath fragile or amorphous; cells 4-7 mic. in diameter, 2-5 mic. long, not constricted, transverse walls frequently granular; apex slightly attenuate, calyptra spherical. On moist earth at bottom of walls, around pumps, cisterns, etc., rarely on banks of streams or on rocks sticking out of streams; very common. (G., 187, 5, 23, 24; T., 107, 5, 18, 19.)
47. Trichomes flexuous, upper part in a lax spiral, rarely uncinata .. **O. terebriformis**
 Stratum dark coloured; trichomes slightly tapering at apex, not capitate, rounded or truncate, no calyptra; cells 4-6.5 mic. in diameter, 2.5-6 mic. long, transverse walls granular. In sulphur waters, thermal; on rocks and trunks of trees. (G., 234, 7, 24; T., 83, 4, 39.)
47. Upper part of trichomes not in a spiral,
 (a) cells nearly or usually as long as broad 61
 (b) cells shorter than broad 62
48. Terrestrial **P. foveolarum**
 Stratum thin, dark green trichomes about 1.5 mic. in diameter, twisted, constricted at joints; cells 8-2 mic. long, transverse walls not granular; apex not tapering, calyptra none. On limestone rocks and on moist earth, sometimes with *P. autumnale*. (G., 164, 4, 16; T., 94, 4, 54.)
48. In fresh water 64

(To be continued).

BRITISH ASSOCIATION NOTES.

Professor Boyd Dawkins, during the discussion on ancient jaws, opined that talking did not necessarily imply intelligence.

In addition to the Official Handbook, the local Committee issued a handy Guide to the neighbourhood, a Handbook of the geological excursions, etc.

The attendance of members at Birmingham was not so large as was anticipated, being only a little above 2,600. This is not many more than the numbers at Dundee last year.

This year the British Association again issued the Presidential Address and abstracts of papers read at each section, in one wrapper, for sixpence, and was again much appreciated by the members.

Mme. Curie was among the recipients of honorary degrees at the University of Birmingham. Sir Oliver Lodge, in presenting her, said she was the discoverer of radium and the greatest woman of science of all times.

Mr. Horwood has again made a discovery. Somehow he has ascertained that the rock-soil distribution of plants can aid the detection of geological boundaries, and he tells us that ecologists are finding this fact useful in their work. As it happens, it was one of the strong points of the ecologists from the very inception of their science, and has been familiar to the geological surveyors from the time of William Smith. We expect that next year Mr. Horwood will tell the British Association that different geological strata can be identified by the fossils they contain.

According to a leading article in one of the leading daily papers, 'The man in the street, to whom the scientist attempts to demonstrate the existence of the soul by adducing the existence of a something of incomprehensible and apparently contradictory qualities called the æther, will not be satisfied. If he wants to learn about the soul, about the life to come, he will go, not to science, which can tell him nothing, but to dogmatic religion, which tells him boldly what he wants to know in clear and intelligible language.' We can only hope that our friend in the street is satisfied.

In her address to the Botanical Section, Miss Ethel Sargent, the first lady to preside at a Section of the Association, stated:—'Section K (Botany) has made a great innovation in choosing a woman for its President this year, and I will not refrain from thanking you in the name of my sex because I happen to be the woman chosen. And, though I must and do feel very keenly the honour you have done me as a botanist, yet that feeling is less prominent than gratitude for the generosity shown to all women in that choice. Speaking in their name, I may venture to say that the highest form of generosity is that which dares to do an act of justice in the face of custom and prejudice.'

An idea of the variety of subjects discussed at the various Sections of the British Association may be gathered from the following titles, selected from many scores:—'A Development of the Theory of Errors with reference to the Economy of Time'; 'The Divisibility of $2p-2$ by p^2 '; 'A Temperature See-saw between England and Egypt'; 'The Sensitiveness of the Human Skin as a Detector of low voltage alternating Electrostatic Fields'; 'A Study of the Degradation or Enhancement of Quality of commercial Copper by the presence of impurities'; 'Optical Rotatory Powers and Dispersions of the Members of Homologous Series'; 'A new Method for the Determination of Hydroxyl ion Concentration'; 'On the place of *Rhynchonella concinna* in the Oolite Series'; 'Some further Notes on *Palaeoxyris* and other allied Fossils, with special reference to some New Features found in *Vetacapsula*'; 'Marriage by Capture by a

West African Wasp'; 'The Classification of the Pierines'; 'Pseudo-hermaphrodite Examples of *Daphnia pulex*'; 'A Mammal-like Milk Dentition in a Cynodont Reptile'; 'Across Southern Jubaland from the coast to Mount Kenia'; 'A forward Canal Policy'; 'A Method of exploring Sand Bars'; 'The relative Age of the Tribes with patrilineal and matrilineal Descent in the South-East of Australia'; 'Souling, Clementing, and Catterning: three November Customs of the Western Midlands'; 'The Evidence for the Custom of Killing the King in Ancient Egypt'; 'The Female Magician in Semitic Magic'; 'Stone Boiling in the British Isles'; 'The Absurdity of Psycho-physiological Parallelism even as a Hypothesis'; 'The Relation of the Weight of the Kidneys to the Total Weight in Cats'; 'A New Theory of Laughter'; 'The Analysis of some Personal Dreams, with special reference to Current Theories of Dream Interpretation'; 'Histology of the Leptoids in Polytrichum'; 'Observations on the Centripetal and Centrifugal Xylem in the Petioles of Cycads'; 'The Need of a Common Alphabet for the Vernacular Languages in India'; 'Further Observations on the Fungicidal Action of Bordeaux Mixture'; 'The value conferred on Dung by Cake Feeding'; 'The Effect of Reproductive Cycle on Glycogen and Fat Metabolism in Crustacea.'

NEWS FROM THE MAGAZINES.

Mr. E. B. Dunlop writes 'On Incubation' in *British Birds* for September.

Deiopeia pulchella is recorded for Derbyshire, in *The Entomologist* for September.

A fine tooth of an elephant is illustrated, in *The Sphere* for August 30th, as 'An Ancient Rhinoceros tooth found near Ealing.'

Among the more important additions to the *Ipswich Museum*, recorded in its *Sixty-Fourth Annual Report*, we notice the Miss Nina F. Layard collection of local antiquities, and the J. Reid Moir collection of worked flints.

"'White-Heads' or 'Take-All' of Wheat and Oats (*Ophiobolus graminis* Sacc.)," is the title of *Leaflet No. 273* which can be obtained free on application to the Board of Agriculture and Fisheries, 4 Whitehall Place, S.W.

The *New Phytologist*, Vol. 12, Double Number, Nos. 4 and 5, contains a lengthy paper by Mr. W. B. Crump on 'The Co-efficient of Humidity: a new method of expressing the soil moisture,' which has already been referred to in these columns.

Mr. A. Smith has issued a *General Guide to the Lincoln Museum* (16 pages, one penny) in which he once more appeals for specimens for the collection. A well known Lincolnshire naturalist will hardly recognise his name therein as Percock.

A paper by Mr. Tor Hellesen on *Chrysomela sanguinolenta* L. and its allies, written in Esperanto, has been published in the '*Aarshefte*,' of the Stavanger Museum. A writer in the *Entomologist's Monthly Magazine* asks whether papers of this kind, written in Esperanto, should be recognised.

The *Report of the Director and Librarian of the County Borough of Warrington, Museum Committee*, for the past year is a record of steady progress, many of the additions being of especial local value. As a frontispiece to the report is a view in one of the rooms, though we sincerely trust that the two venerable old gentlemen, whose portraits appear at the end of the room, are labelled 'Wild Flowers' in mistake!

Naturalist.

TO OOLOGISTS AND ENTOMOLOGISTS.

W. F. H. ROSENBERG, Importer of Exotic Zoological Specimens, 57, Haverstock Hill, London, N.W., England, begs to announce the publication of two new Price Lists:—No. 18, Exotic Lepidoptera (over 8,000 species); No. 19, Birds' Eggs (over 1,100 species). These will be mailed free on application, as well as any of the following lists:—Birdskins (over 5,000 species); Mammals (over 300 species); Reptiles, Batrachians and Fishes (over 400 species). Largest stock in the world of specimens in all branches of Zoology.

All Museums should write for these Lists. All specimens sent on approval. Please state which lists are required, and give name of this periodical.

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October 1st, 1913.

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A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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AND

T. W. WOODHEAD, Ph.D., F.L.S.,

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YORKSHIRE NATURALISTS' UNION.

VERTEBRATE ZOOLOGY SECTION: ANNUAL MEETING.

President:—H. B. BOOTH, Esq., M.B.O.U., F.Z.S.

Two meetings will be held in Room C 7, at the Leeds Institute, Leeds, at 3-15 p.m., and 6-30 p.m., respectively on Saturday, November 15th, 1913.

BUSINESS AT THE AFTERNOON MEETING:—

To consider and pass Sectional Reports for 1913, and to elect officers for 1914.

To consider and pass the General and Financial Reports of the Yorkshire Wild Birds' and Eggs' Protection Acts Committee for 1913, and to elect the Officers and Committee for 1914.

To consider and pass the Report of the Yorkshire Mammals, Amphibians, Reptiles and Fishes Committee for 1913, and to elect this Committee for 1914.

The following papers (mostly illustrated by lantern slides or specimens) will be given:—
'The Black-tailed Godwit and a Camera,' Mr. Jasper Atkinson. 'An afternoon with a pair of Artic Terns and their Young,' Mr. Riley Fortune, F.Z.S. 'The Scarborough Herring Fishery,' Mr. Oxley Grabham, M.A., M.B.O.U. 'Yorkshire Bats,' Mr. A. Whitaker.

Any Member or Associate of the Yorkshire Naturalists' Union is invited to attend and to bring notes, specimens, lantern slides, etc., or matters of interest connected with the work of the Section, and to take part in any discussion.

Will Officials of Affiliated Societies kindly notify their Members?

Any further particulars from:—

A. HAIGH-LUMBY (*Hon. Sec.*),
Nab Drive, Shipley.

BOOKS FOR SALE.

From the Library of a Yorkshire Geologist, recently deceased.

BEWICK. Geological Treatise in North Yorkshire (cloth). 7s. 6d.

PHILLIPS. Geology of Yorkshire. Mountain Limestone District
(cloth). 12s. 6d.

Journal of the Northants Field Club. Vols. 3, 4, 5 (cloth). 2s. 6d. each.

'The Naturalist,' 1907 (cloth). 5s.

Reports of the British Association. Bath (1864), Birmingham (1865),
Nottingham (1866), Dundee (1867), Norwich (1868), Exeter (1869),
Liverpool (1870), Edinburgh (1871), Bristol (1875), Glasgow (1876),
Montreal (1884), Birmingham (1886). (Cloth). 2s. each.

'The Geologist.' Vols. 4 and 5 (half-calf). 3s. 6d. each.

'Science Gossip,' 1866, 1872, 1875. (Cloth). 2s. each.

'The Antiquary.' Vols. 1, 2, 3, 4, 5, 36, 37 (half-calf). 2s. each.

'The Midland Naturalist.' Vol. 1 to 8 (scarce). (Bound.) 12s. 6d.

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NOTES AND COMMENTS.

'THE EARLIEST MAN' AGAIN.

We learn from *Nature* that certain human bones discovered in 1911 by Mr. Hiram Bingham in gravel near Cuzco, Peru, have been considered to indicate the existence of man in that country between twenty thousand and forty thousand years ago. In an article in the July number of the *American Journal of Science*, Mr. G. F. Eaton, who has visited the spot, states that the associated remains are essentially of a modern type, including, as they do, bones of domesticated cattle. He therefore concludes that the bones were buried some time 'during the three centuries and a half that have elapsed since the Spaniards brought domestic cattle to Peru.' In a second article in the same issue Mr. H. E. Gregory states that although his investigations on the spot do not definitely disprove the theory of the great age of the bones, yet 'the geologic data do not require more than a few hundreds of years as the age of the human remains found in the Cuzco gravels.'

BONES OF WHALES.

In *The Scottish Naturalist* for September, Mr. W. Taylor records a vertebra of Rudolphi's Rorqual from the post-glacial sand of Elgin. It is stated that 'as Elgin is about five miles from the sea, and the river Lossie at this point 50 feet above sea level, the bone must be very old. Probably it was washed out of the post-glacial sand.' While in this case the bone may be 'very old,' it must be remembered that many bones of whales found their way considerable distances inland during the old whaling days. This was especially so with regard to jaw-bones, which were used as gate-posts; and vertebrae, which were in demand as chopping blocks for butchers, etc. We have many such instances in Yorkshire and Lincolnshire, and some years ago the writer remembers visiting Nottinghamshire to examine some extraordinary bones which had been 'discovered,' only to find that they were the remains of whales' jaws, which had doubtless been carried down the Trent by river craft.

PRESERVATIVES IN FOOD.

We do not usually expect to find humour in the Report of a Borough Analyst, but the following remarks, taken from the Halifax analyst's, are not without their moral:—'Our food is so varied, and drawn frequently from such distances, that preservatives are essential unless some articles are to be abandoned. It would appear that a return to simpler and fresher foods would do us good, but I fear congested town conditions prevent this. Boric acid, salicylic acid, and formaldehyde are the chief preservatives, and we get them at

every meal, so that the total daily dose may be appreciable and not without effect on a sensitive system. Starting the day with bleached bread, borated bacon and butter, and jam or marmalade cum salicylic acid, not to mention the silicated egg, which doesn't count, we plough bravely through formalized meat, coppered peas, talc-faced rice pudding, and later engage with shrimps, or sausage, or meat pie of even deeper dye, and more butter, bread, cream, and cheese of the same failing as above, not forgetting wine, beer, or other liquid scarcely innocent of a like indictment. It is difficult, nay impossible, to steer clear of the enemy. The marvel is that we are not mummified in the course of time, as indeed we should be if the effects were even moderately cumulative. It is easy to see that on a particularly unlucky day a person may have good cause for not feeling quite fit. The only comfort to be derived from it is in the reflection that the microbes are having an even worse time of it than we are."

SOCIETY FOR THE PROMOTION OF NATURE RESERVES.

In view of the dangers which at present seriously threaten our indigenous fauna and flora with extinction, the above Society has been formed with the following objects:—I. To collect and collate information as to areas of land in the United Kingdom, which retain their primitive conditions and contain rare and local species liable to extinction owing to building, drainage and disafforestation, or in consequence of the cupidity of collectors. All such information to be treated as strictly confidential. II. To prepare a scheme showing which areas should be secured. III. To obtain these areas and hand them over to the National Trust under such conditions as may be necessary. IV. To preserve for posterity as a national possession some part at least of our native land, its fauna, flora, and geological features. V. To encourage the love of nature and to educate public opinion to a better knowledge of the value of Nature Study. These objects are to be attained by means of the Press, by personal efforts, and by correspondence with local Secretaries and individuals. The Rt. Hon. J. W. Lowther, M.P. is the president, and the Hon. Secretaries are W. R. Ogilvie Grant, Esq., and the Hon. F. R. Henley.

A CONNECTING LINK WITH WILLIAM SMITH.

The *Yorkshire Observer* recently gives the following extract from the '*Observer*' of September 6th, 1838:—'**STONE FOR THE NEW HOUSES OF PARLIAMENT.**—We understand that Mr. Barry, the architect, and Mr. de la Beche have set out from London, under the authority of the Treasury, to examine the quarries in the North, in search of stone for the new Houses of Parliament. They will avail themselves on the way of the aid

of Dr. Smith, the geologist, and they take with them William Smith, a practical mason. The object is, in conjunction with an examination of the quarries, to see the situations in which, and the buildings upon which, the material from the respective quarries has been used ; and the mission is thus likely to work well, not in the particular instance only for which it was suggested, but in the interests of building all over the kingdom.'

AMERICAN METHODS.

From an official publication issued by the United States Geological Survey, we learn that there has been 'Another Geological Survey Fire. This time entire building and contents barely escape destruction.' A new building is to be erected, which will take three or four years. 'According to the record of the last few years, three or possibly four more fires must be reckoned with, since an annual fire event for the Geological Survey building has come to be expected copy for the Washington newspapers.' Then follows the announcement 'FIRE SALE. Geological Survey Institute's Unique Procedure in offering its Geologic Folios at One-Fifth usual price as Result of Fire in Survey Building,' and '150,000 folios are offered at the nominal price of 5 cents each.'

SEA FISHERIES.

Of far more than mere economical importance are the two parts of the Annual Report on Sea Fisheries for the year 1912, recently issued by the Board of Agriculture and Fisheries. Part 1, issued for 10½d., contains the 'Report,' while part 2, issued at 1s. 8d., contains the Tables and Charts. Details are given of the scientific and economic progress made with regard to fishing and fishes in British waters. One unexpected piece of information is that 'the remarkable progress which has distinguished the Norwegian Whaling industry in the last few years continued during 1912. Since 1906 the capital invested has increased from about £215,000 (twenty-one companies) to £2,173,000 (sixty-one companies). This notable development has been confined to the Southern Seas. It is not surprising, however, that 'The rapid and world-wide expansion of the industry has given rise in various quarters to expressions of opinion that signs of depletion of the stock of whales are already observable, and that means for its better protection will have to be considered.' We were agreeably surprised to find this Government Report containing an account of the contents of the new Museum of Fisheries and Shipping at Hull.

A BAD ATTACK.

The following description of a strange monster is given in a recent issue of *Toilers of the Deep*. The record is made off the west coast of Australia by people 'whose sobriety,

intelligence, and accuracy we guarantee':—'Just before sundown on a calm day, with small waves breaking on the coast, they noticed half a mile off a dark object moving among the dunes. They advanced towards it, but when about forty yards off it rose and rushed down into the sea. After getting out about thirty yards it turned round, showing only the head for five seconds, and then drew under water and disappeared. It was fifteen feet long. Its head was only about the size of a kangaroo dog's. It had a thick, arched neck, passing gradually into the barrel of the body. It had no definite tail, and no fins. It was furred, the coat resembling that of a chestnut horse colour, well groomed and shining. It had four distinct legs. It travelled by bounding—arching its back and gathering up its body, so that the footprints of the forefeet were equally advanced, and also those of the hind feet. These footprints showed circular impressions with a diameter of nine inches, and the marks of four claws about seven inches long, extending outwards and away from the body. The prints showed about four feet between the marks of fore and hind feet, and then a gap of about ten feet, making a total of fifteen feet for each leap. Laterally they were two feet six inches apart.' Unfortunately the animal got clear away and the tide obliterated its footprints!

THE ORIGIN OF LIFE.

In his Presidential Address to the Ealing Scientific Society (Report for 1912-13, p. 3) on 'The Origin of Life,' by Mr. W. Deane Butcher, he opines that 'it is possible that in the laboratory there will be built up molecules so complicated and delicately balanced that they will respond to the vital thrill. But we shall have penetrated but little deeper into the mystery of life itself, the psychic and spiritual force which pervades the universe, of the origin of which we really know nothing.'

THE INTERGLACIAL PROBLEM.

At the request of the Executive Committee of the Congrès Géologique International, Mr. G. W. Lamplugh, F.R.S., has prepared an excellent statement of the present position of the Interglacial Problem in the British Isles. Our readers will remember that in his Presidential Address to the Geological Section of the British Association, Mr. Lamplugh carefully reviewed the so-called evidence in favour of Interglacial Periods, and found it wanting. Since then he has 're-examined the crucial sections of the Yorkshire coast and some other parts of the East of England, and has also been able closely to investigate fresh areas in the Midland counties and in the borders of North Wales where it has been supposed the interglacial conditions were represented; but again without finding any

justification for the hypothesis. It is therefore with increased confidence that I reiterate my former conclusions.' Mr. Lamplugh concludes, 'I can see no reason for supposing that our islands have been more than once enwrapped by ice-sheets, however the case may stand in other countries.'

AGE OF SUFFOLK VALLEYS.

At a recent meeting of the London Geological Society, Mr. P. G. H. Boswell read a paper on the Age of the Suffolk Valleys ; with Notes on the Buried Channels of Drift. The main watershed of Suffolk follows generally the Chalk Escarpment, but keeps rather to the east of it, running in a north-easterly direction from Haverhill in the extreme south-west of the county. Suffolk forms a plateau, 100 to 400 feet O.D., dissected by a valley-system which is palmate in form, the chief rivers, taken from north to south, being the Waveney, the Alde, the Deben, the Gipping (with its estuary, the Orwell), the Brett, and the Stour. The Little Ouse and the Lark flow north-westwards into the Wash basin. The strata, cut through by the valleys, and the mantle of Glacial deposits which more or less covers the whole county, were described briefly. Reasons were given for thinking that the Contorted Drift does not extend far south of the Waveney. The valleys, although they may have been etched earlier, are on direct evidence post-Pliocene in age ; but, by analogy with the Waveney and the Norfolk rivers, they may be younger than the Contorted Drift. The Upper Boulder Clay covers much of the plateau, and wraps down into the valleys in a very characteristic manner. The Glacial Sands, etc., below it also appear at times to lie on the valley-slopes.

THE BURIED RIVER CHANNELS OF EAST ANGLIA.

Intense glacial disturbances are found to be situated always on 'bluffs' or 'spurs' of the plateau projecting into the wide open valleys, which were thus in existence before the advent of the valley-glaciers to the action of which the disturbances have been attributed. In each of the main valleys occur one or more buried channels of Drift ; borings made recently allow these to be described in detail, and the deposits filling them to be discussed. The evidence indicates that the pre-Glacial or early Glacial contours of Suffolk were in the main much as they are now. The form of rivers and valleys suggests that some amount of capture may have taken place before the deposition of the Upper Boulder Clay ; and that the present river-system is recovering from a state of arrested development, due to the 'overloading' of the valleys with Drift deposits and torrential debris during the last glaciation of the area, and to the subsidence (some 60 to 80 feet) which followed it.

THE SCANDINAVIAN GLACIER.

In the discussion which followed, Mr. F. W. Harmer said that the question of the origin of the valley-system of East Anglia should be studied as a whole, and over as wide an area as possible. If it were possible to ascertain the conditions obtaining in one part of the region, it would not be unreasonable to draw conclusions as to what was going on at the same time in another. The facts to be observed in Norfolk, where the evidence was clearer, might therefore throw light on those adduced by the Author from the sister country. In the speaker's opinion, East Anglia was invaded by ice; and first from the north, by the Great Scandinavian glacier. To this invasion was due, not only the Contorted Drift of the remarkable and abrupt ridge which crosses the north-eastern portion of Norfolk from west-south-west to east-north-east, attaining a maximum thickness of 300 feet, but also the uncontorted beds of brick-earth equivalent to it which occur over the lower and flattened region towards Norwich. The latter the speaker considered represented the moraine profonde of the North Sea ice during its maximum extension; the former, the contorted part, a terminal moraine at some stage of its retreat.

DATE OF THE VALLEY SYSTEM.

Now, it seems clear that when the North Sea ice crept over the country from the Cromer coast to the latitude of the Waveney valley and beyond, the present valley system of East Norfolk could hardly have been in existence: any pre-Glacial elevations then existing would have been levelled down by the ice, and any pre-Glacial depressions levelled up, or filled in by the morainic detritus brought by it. Moreover, the North Sea Boulder-clay never occurs in this region as a valley deposit; on the contrary, the valleys, as, for example, those of the Yare and Wensum at Norwich, and of the Waveney at Beccles, are distinctly shown to have been cut out of it. The excavation of the Norfolk valleys took place after or during the retreat of the North Sea ice-sheet, but before the deposition of a part at least of the Chalky Boulder Clay. It may have been due, not improbably, to the action of torrential water during the retreat and melting of the ice of the first glaciation.

PRESIDENCY: YORKSHIRE NATURALISTS' UNION.

At an unusually well-attended meeting of the Executive Committee of the Yorkshire Naturalists' Union, recently held, it was unanimously agreed to offer the Presidency of the Yorkshire Naturalists' Union, for 1914, to Mr. Thomas Sheppard, F.G.S., who for many years was the Hon. Secretary of the Union and did so much with regard to completing and publishing the Union's various monographs. We understand the invitation has been accepted.

NEW MITES.

C. F. GEORGE, M.R.C.S.,
Kirton-in-Lindsey.

1.—*Trombidium mushami* n.sp.

I HAD this mite sent to me alive, with others, by Mr. Musham, of Selby, more than a year ago. I mounted it in balsam without dissecting it, hoping to get another specimen for that purpose. In this, so far, I have been disappointed. Mr. Soar, however, has made a characteristic drawing from the mounted slide. It will be seen by the figure that the mite is rather



Trombidium mushami × 16.

heart-shaped and has the apex distinctly emarginate. The sides are more convex than they appear during life, in consequence of the figure being drawn from a mounted specimen somewhat compressed by the cover glass. In the September number of *The Naturalist* for 1908, is a description of *T. holosericeum* which, with certain differences, would almost pass for that of the present mite. The most important of these differences are, (1) the size—This mite is very much smaller. Mr. Soar's measurements of *T. holosericeum* are, length, 2·80 m.m., width, 2·40 m.m.; *T. mushami*, length, 1·65 m.m., width, 1·45, *i.e.*, about half the size. (2) the colour—*T. holosericeum* is a fine scarlet, while *T. mushami* is a very dark ruby, much of this colour is retained by the papillæ even after mounting in balsam. (3) The hairs or papillæ are much shorter

and less silky, forming a rather thick felt; the ends of most being rather thickly knobbed, and often nearly black, give a granular appearance to the body, especially at the sides and posteriorly. A glance of the two mites under the microscope would satisfy any observer of this specific difference, probably a dissection of the crista would reveal other structural differences.

2.—*Trombidium bicolor* Hermann.

I have long wished to see a satisfactory example of this mite. Hermann himself says it is rare and found in gardens. A year ago Mr. Musham sent me some mites preserved in spirit, taken during October at Canwick, near Lincoln, and among them I found a fine female specimen. It is indeed a very striking mite and well deserves its name of bicolor, for the legs are bright coral red, and the body black, the hairs or papillæ also are simple and colourless. On dissection I found the crista something like the one figured on plate 2 of *The Naturalist*, for February, 1910. The contents of the abdomen were nearly black, and consisted of a number of dark-coloured eggs and a blackish substance. The skin itself was then transparent. The mite is not likely to be confounded with any other species, and I am not aware that it has been previously recorded in England.

—: o :—

No. 273 of *The Quarterly Journal of the Geological Society* contains a paper by Dr. J. E. Marr on 'The Lower Palæozoic Rocks of the Cautley District'; one by Mr. Stanley Smith on the genus *Aulophyllum*; one by Professor A. C. Seward on Wealdon Floras; and one by Messrs. C. Dawson and A. Smith Woodward on the Human Skull and Mandible found at Piltown.

Dr. Marie Stopes' 'Humorous Botanical Annual,' the 'only comic scientific journal,' *The Sportophyte*, (Dulau and Co., rs.) begins its whimsicalities by calling a 24 page pamphlet 'Volume IV.' And when she tells us herself that 'the best joke' is played on her readers by the publication not appearing on April 1st, we know what sort of hilarity we are likely to indulge in. There is a large illustration dedicated to the Gridicologists, showing a (presumably) Professor of Botany and a (presumably) botanical lady friend sat on a moor measuring daisies. But they must have known the sketch was being made, as he has his eye 'glewed' to the ground and she turns her back to him and hides her face in a (presumably) pillow; anyway we never saw a bonnet like it. But the sketch is pathetic rather than comic, and is so poor that we shall expect to see it in next year's Academy. There is an 'Opera' on Botany's Bride (which has nothing to do with the Editor), and a poem on 'The Pea.' We hope it is not owing to the fact that the editor may not, nowadays, be quite seeing the same funny side of life, but the present part of *The Sportophyte* did not amuse us anything like so much as did its predecessors. And surely the following is libellous:—

There was once a Professor named Weiss,
Who to girls was so 'awfully neiss,'
That one little maiden,
Though Botany laden,
Sat Inter-Biology tweiss.

GEOLOGY AT THE BRITISH ASSOCIATION.

W. LOWER CARTER, M.A., F.G.S.

THE proceedings of Section C were of average interest and were consistently attended by a goodly number of geologists, though the number of steps to be climbed to the meeting room no doubt kept the roving members at a minimum. The presidential address of Professor Garwood was dealt with in the last number of *The Naturalist* and awakened much interest as opening a new chapter in the study of rock-building organisms. This was followed by a lucid and masterly address on the geology of Birmingham, by Professor C. Lapworth, which was supplemented by notes on the igneous rocks of the district by Professor W. W. Watts. Several important papers on the local geology were read. Mr. Henry Kay described the Black Country plateau with its marginal hill barrier and four interior drainage areas. The recession of the midland watershed, owing to the activity of the Warwickshire Avon, was described. Glacial modification was much in evidence and a lake overflow valley is traceable through Walsall. Extensive buried valleys have been found. The Trent drainage area has been subjected to excessive piracy and has steadily suffered loss. Its sole gain is that of the Penk at the expense of the Dec. The northern drainage is consequent on the formation of the South Staffordshire anticline. Speculations as to the former north-west extension of the Thames drainage must be abandoned.

The basal Carboniferous beds at Lye were described by Messrs. W. Wickham King and W. J. Lewis. Below the thick coal in Lusbridge Brook are 280 feet of clays and coals, underneath which are beds of conglomerate and clays with limestone grit and cherts, which contain many imperfect casts of fossils. They were probably laid down in the vicinity of a shore line, and the conglomerates show distinct evidence of inter-Carboniferous denudation. Mr. Frank Raw described a wind-worn rock surface at Lilleshall Hill, Salop, which is a 'hogsback' of Uriconian. The whole of the rock surface has been ground and polished. The surfaces of projecting masses of the conglomerate near the Monument are deeply fluted as by wind-blown sand. In the excavations for the Lilleshall reservoirs many sand-polished stones were found embedded in sand. Interesting notes on the Flora and Fauna of the Upper Keuper Sandstones of Warwickshire and Worcestershire were presented by Messrs L. J. Wills and W. Campbell Smith. At the base of the belt of sandstones which underlies the Keuper Marls comes a bone bed, composed of fragments of green marl, plants, fish remains, and teeth and bones of labyrinthodonts. In

this bed were found for the first time in the English Trias, examples of the foliage and scales of the female cone of a *Voltzia*. *Estheria minuta* occurs in both shales and sandstones. The beds are similar to the Skerry-belts of Nottinghamshire and Leicestershire which were due to floods of fresh water, but in the bone beds there is evidence of littoral conditions. This was not a pre-Rhaetic incursion of the sea, but a littoral facies of the Keuper marls, formed where the water was at times sufficiently fresh to support a small fish fauna, and in sufficient motion to move coarse sediments.

Mr. Fred G. Machen's survey of the development of the Midland coalfields showed that in 1836 nearly all the mines were shallow, and produced fifteen thousand tons a year, but now the output was fifteen million tons. The output would have been greater had the deeper mines proved more remunerative, the shallow mines ruling the selling prices. The discovery of concealed coalfields had enlarged the workable area from one hundred and twenty to seven hundred and sixty-six square miles. It is believed that the area between the South Staffordshire and Leicester-Warwick coalfields will be found to be one continuous coalfield. Vigorous investigations which have been made in the area between the Staffordshire and Shropshire coalfields show that this area is going to prove rich in coals of good quality. Little had been done to extend the Shropshire coalfield on the western side, but in the Highley and Kinlet and Billingsley area it is most probable that future deeper sinkings will prove coals beneath the two seams at present working, while the area to the east is full of promise.

Mr. Robert D. Vernon gave details of the correlation of the Leicestershire with the neighbouring coalfields. The general sequence resembles that of Derbyshire, but the presence of unusually thick seams of coal which split towards the north favours a comparison of the Middle Coal-measures of Leicestershire with those of Warwickshire. In the complete absence of the Transition series and Upper Coal-measures, and the presence of a complex fault system, the Leicestershire coalfield stands quite apart from either of its neighbours. Detailed correlation from the physical side being impossible, the problem was attacked from the palæontological side. Fossil plants proved of relatively little value, because the lowest and highest plant-bearing horizons both appear to fall within the Middle Coal-measures. The freshwater lamellibranchiata were equally unsatisfactory, so that search was made for marine beds. The Ashby area yielded no fossils, and so the age of its beds remains an open question. The Cole Orton area is mostly a concealed coalfield worked beneath a Trias cover. The western or Moira area shows a more complete sequence and exposures are more

numerous, which include many fossiliferous horizons, yielding a rich flora, several rare crustacea, some fragmentary fish remains, and numerous freshwater lamellibranchs. An abundant marine fauna has also been obtained from several horizons. The thickest marine bed has been mapped, and, using it as an index bed, the position of the pot, pipe, and fireclays in the Moira sandstones can be fixed. This marine bed is comparable with the Gin Mine marine bed of the North Staffordshire coalfield, with the Mansfield marine bed of the Yorkshire and Nottinghamshire coalfield, and with the Pennystone ironstone marine bed of Coalbrookdale.

Mr. G. Barrow gave further views on the Systems of Folding in the Palæozoic and newer rocks. From evidence on the flanks of crystalline areas in the Highlands, Ireland, Anglesea, and the Isle of Man, it was seen that the margin was a great line of resistance, and the folding in the adjacent Palæozoic or newer rocks was parallel to it, and was the cause of the strike of the folding. Under earth-stresses the softer rocks have buckled up against a great resisting crystalline mass. There was, therefore, no Caledonian movement, but only a series of resisting masses with parallel margins. The writer believed that in South Britain and North France the tracing of the outer margins of crystallization will prove that the Hercynian System simply means that the boundaries of the resisting crystalline masses against which the newer rocks buckle up now trend east and west. This will explain the local departure of the strike of the folding in the North of England; the lines of resistance locally depart from their usual trend and the subsequent folding does the same.

Dr. Gertrude L. Elles described the relation of the Rhiwlas and Bala Limestones at Bala. The difficulties in the interpretation of the Bala district were largely due to the imper-sistent nature of the limestones and their inconstancy as to horizon. The Rhiwlas limestone is an imper-sistent limestone at the base of the Hirnant series, and is found only in the northern part of the area. The Bala limestone is not developed as a calcareous bed in the northern part of the area, but is somewhat more persistent as a definite band in the southern and eastern portions of the district. The true relation is seen in the type section at Gelli Grin, where the Bala limestone at its maximum thickness is overlain by light-coloured pasty mudstones containing a typical Rhiwlas limestone fauna.

Miss Elles also read a paper on the shelly and graptolitic faunas of the British Ordovician, in which she described the two main types of 'shelly' faunas of Ordovician Age, (a) Asaphid-Trinucleid-Calymenid fauna, and (b) Cheirurid-Lichad-Encrinurid fauna. She showed that they could be further divided into a number of sub-faunas which can be correlated

by reference to associated graptolite-bearing beds. Evidence suggests that (*b*) is an exotic fauna, possibly southern in origin, which migrated into the British area. Becoming early established in South Scotland, it soon spread west into Ireland, but did not dominate the whole British area till Ashgillian times.

Dr. Newell Arber described the recent advances in knowledge of the rich fossil faunas of the South Staffordshire Coalfield. Attention had been chiefly concentrated on the floras of the brick clays and of the beds on the horizon of the bottom coal. Considerable numbers of species have been obtained from both horizons, of which some are new records both to the coalfield and to Britain.

Dr. Marie C. Stopes described, and illustrated with photographs, petrifications of plants in the freshwater cherts of Lulworth (Purbeck) and Asia Minor (Tertiary). The cherts contain beautifully preserved pollen-grains, fungi, stem débris, etc., and the existence of these delicate soft tissues so well preserved suggests that Sollas's view of flint formation can only be applied with caution to these freshwater cherts.

Dr. A. H. Cox gave a note on the Igneous Rocks of Ordovician age. As the sedimentary rocks of this age consisted chiefly of a great thickness of shales and sandstones, implying that the sediments were deposited over an area which was undergoing slow but prolonged subsidence, it was to be expected that the associated volcanic rocks would approximate to the keratophyre-spilite series, and this appears to be the case. The importance of the pyroclastic rocks also is very marked. It is not uncommon to find tuffs building up the whole of a thick volcanic series. This is in marked contrast to all the volcanic series of later date in the British Isles, and is not merely explainable by the fact that the eruptions were submarine, and that therefore the clastic products were more likely to be preserved. The further explanation is in the viscosity of the magmas, and this high viscosity has been noted in the spilites. It is just such highly viscous lavas that would be expected to furnish a large amount of pyroclastic material. This appears to be another illustration of the connection between rock types and types of earth movement.

Dr. Hubert Cox and Professor O. T. Jones described pillow lavas from Strumble Head, Pembrokeshire, Cader Idris, and two localities in Carnarvonshire. The same authors gave the results of an examination of the district between Aberiddy and Pencaer, Pembrokeshire, which they propose to follow up by mapping the area in detail.

Mr. C. V. Illing gave a valuable paper on the Stockingford Shales and associated beds of the Nuneaton area, in which

he had found a complete sequence of Cambrian beds with fossils which showed a close affinity with the Scandinavian development. In the discussion which followed the great value of these researches was pointed out, and that this is likely now to become the type section of the British area. Mr. Illing also exhibited a series of magnified pictures of the triobites found in the beds showing several new forms of *Agnostus*.

Dr. Vaughan Cornish described the conditions of the transport of detritus superficially and in suspension. He pointed out that the rate of subsidence is the constant which best defines the behaviour of a granular material with respect to transportation by currents. The detritus may be classified in three groups according to the value of this constant. He pointed out that the change of direction of the vertical currents in sea waves does not occur simultaneously with the change of direction of the horizontal currents, and the result of the sequence of the changes is to endow waves with a shoreward action upon shingle and the coarser kinds of sand independently of any motion of translation in the water. In tides also rise does not commence simultaneously with flow, nor fall with ebb, and the sequence of these changes is such as to make the flood tide more effective than the ebb as an agent of littoral drift, apart from any greater speed of current.

A fine series of Field Excursions was arranged under the supervision of Professor Lapworth, who prepared for the Handbook an excellent account of the geology and geography of the neighbourhood, illustrated by maps. On Saturday, 13th September, large parties of geologists were conducted to the Lickey Hills and the Clent by Professor Lapworth, to Nuneaton and Atherstone by Professor W. W. Watts and Mr. Illing, and to the Wrekin by Professor W. S. Boulton. The climatic conditions were excellent and the excursions thoroughly appreciated. Afternoon excursions were also taken to Dudley and the Wren's Nest under Professor Lapworth, to the Lickey under Mr. F. Raw, and to Halesowen under Mr. L. J. Wills. The usual Geological Dinner was arranged, and proved a pleasant and successful function.

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Mines and Mining in the (English) Lake District. Third Edition. By **John Postlethwaite, F.E.S.** Whitehaven: W. H. Moses and Son. The first edition of this work was issued as long ago as 1877 and we are glad to find the author still hard at work on his favourite theme. The present book is a great improvement and contains many plans and sections of mines, plates of characteristic fossils, views of the mines and of Lake District scenery. There is also added 'a Synopsis of the State Papers relating to the Mines in Newlands, and Smelting works at Keswick, copied from the Calendar of State papers, published by Robert Lemon, F.S.A.' These date from 1561 to 1572. The book will be found exceedingly useful to the more intelligent visitors to Lakeland.

BOTANY AT THE BRITISH ASSOCIATION.

BIRMINGHAM attracted a large muster of botanists, and at the sectional dinner there was a gathering of about eighty members, although not a few well-known seniors were conspicuous by absence. Section K at first was not quite sure about its President. Most of us felt that Botany could nominate a woman if it chose, yet many members felt the need of justifying the new departure, which members of other Sections were not slow in reminding them of. It would be well if future Presidents noted that Committee business went on till 10 a.m., not longer, that the Sectional Meetings finished each day at a timely hour, and that there was a gentle but firm conduct of affairs in general from the Presidential chair.

Miss Sargent's address, a historical summary of the development of botanical embryology since 1870, will be found useful by botanists who do not specially follow that particular branch, which has made great progress and has exerted much influence on the development of the whole science.

The most noteworthy of the more general papers was that 'On the Nature of Life' by Professor Reinke (Kiel). He protests against the view that life can be interpreted mechanically, and maintains that although the laws of energy are valid in many elementary processes of the organism, there is an invisible string or chain—the life-principle—that maintains order among the various processes. This principle is no force or power, it is a principle of succession, of order, and of harmony.

Maritime vegetation gave origin to several interesting papers. Professor Oliver, in dealing with the distribution of *Suaeda fruticosa* on shingle banks, described how the plants remained practically still, while the shingle bank was carried by waves through the zone of *Suaeda*, which thus assumed a new position. (This is part of a larger investigation which has recently been outlined in the 'Transactions of the Norfolk and Norwich Naturalist Society,' Vol. IX., page 485, 1913.) The maritime plant-formations on the Norfolk coast and the sand-dunes on Anglesey were also subjects for papers.

'River Development and its Influence on Plant Distribution,' by A. R. Horwood proved a suggestive paper for the biological geologist or geographer.

The variations in flower structure in *Stellaria graminea*, by A. S. Horne, and the juvenile flowering in *Eucalyptus*, by Professor Weiss, dealt with other aspects of plant life.

The new branch of genetics was represented by Dr. Gates on mutation and Mendelian splitting, and by Colonel Rawson on variation of structure and colour of flowers under controlled illumination.

After flowering plants, fossil research made a good second. Amongst other papers may be noted that of H. Hamshaw Thomas on a new type of Ginkgoalian leaves from the Jurassic plant-bed of Cayton Bay, Scarborough, and one of the Committee reports deals with investigations in the plant-beds at Roseberry Topping and Gristhorpe, during which twenty-two new species have been obtained.

The cryptogamic contributions included a histological study on the leptoids (or sieve-tube elements) in *Polytrichum*, the apothecium of the lichen *Peltigera*, germination of the spores of *Coprinus*, and the biology of the apple canker-fungus *Nectria ditissima*.

The preservation of the British flora was put forward as a subject for discussion by A. R. Horwood as representative of the Selborne Society, and several very radical suggestions were made, but Section K was distinctly conservative, and objected to certain measures suggested for interfering with natural phenomena on the ground that these were more likely to be harmful because of the imperfections of humanity, and there was a strongly-voiced protest against giving land-owners the power to arrest anyone gathering a few flowers. In short, the feeling was that expressed in the Editorial Notes in September. There was, however, considerable sympathy with the general object of plant protection, and local societies were suggested as important agencies in any such work.

Excursions are always a strong feature of Section K, and those at Birmingham maintained the tradition. Mr. Groves, among others, placed his knowledge of the district at disposal, and any preconceived ideas as to lack of botanical interest were dispelled during the excursions to the oakwood vegetation of Wyre Forest and the heaths and ponds of Sutton Park. Hartlebury Common was also visited by the members of the British Ecological Society, which held a meeting before the British Association opened.

The Birmingham Meeting was altogether a great success, and we speak from experience of about a dozen British Association meetings. Such success does not come without someone working hard for months before. The readers of *The Naturalist* will be gratified to hear that the 'someone' mainly responsible for the successful organization at Birmingham was Professor G. S. West, and the success of the outdoor excursions was materially enhanced by the presence of his father, Mr. W. West, of Bradford.

W. G. S.

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As a result of a weekly examination of rooks sent to him for the purpose, Mr. H. F. Witherby has a paper in *British Birds* for October, on 'The Sequence of Plumage of the Rook, with special reference to the Moul of the "Face."' It is illustrated by several plates.

ANTHROPOLOGY AT THE BRITISH ASSOCIATION

H. A. AUDEN, D.Sc.

'THE ADMINISTRATIVE VALUE OF ANTHROPOLOGY' was the title of Sir Richard Temple's Presidential Address to the Anthropological Section. The leading idea was to emphasize the fact that, if the British Empire is to avoid grave mistakes in administration and legislation, it is essential that those to whom the work of government of alien peoples is entrusted should acquire a working knowledge of the habits, customs, ideas that governed the conduct of such peoples and of the conditions in which they passed their lives. It is obvious that Sir Richard Temple's suggestion for the founding of a College of Applied Anthropology will, if carried to a successful issue, be of definite and incalculable utility in the government of an Empire so heterogeneous as ours. It is pre-eminently a case in which 'the proper study of mankind is man.'

In 'A Gypsy Pedigree and its Lessons' the Rev. G. Hall and Mr. W. H. R. Rivers showed that there is no evidence of any diminution in the size of the family, and that, as among other people, there is an excess of male births, while the first-born child is more often male than female.

A paper, 'Gypsy Taboo and Funeral Rites,' contained a selection from a mass of material collected by Mr. T. W. Thompson, mainly from gypsies with whom he was personally acquainted. There are a number of prohibitions based on the belief that contaminating influence emanates from anything used in the washing of apparel or of the person, and anything connected with the toilet or with the bed, also from any sick person. A woman's dress must not be allowed to touch any article of food, or any vessel in which food is prepared or from which it is eaten, otherwise the food or vessel becomes 'mokhadi' (ceremonially contaminated), and must be destroyed. This taboo is probably the basis of destroying, usually by burning, the effects of a dead person. The destruction which is the main feature of gypsy funeral rites, is carried out, not to benefit the deceased in his future life, but from fear that his belongings should afford a lurking-ground for his ghost.

Miss C. S. Burnes's paper shows the great value of systematic study of folk-lore questions. By mapping the areas in which the customs of 'souling,' 'clementing,' and 'catterning' prevailed, the connection between local trades and the cults of patron saints is suggested. Early calendar festivals were at once religious, social, and economic. The Celtic, and perhaps the Teutonic year began and ended in November. In Cheshire, North Shropshire, and North Staffordshire, 'souling' is observed by children, who beg for cakes, ale,

and apples on the first of November; in South Staffordshire on the 23rd of November (St. Clement's Day); in North Worcestershire on 25th November (St. Katherine's Day).

Mr. T. C. Cantrill's paper, 'Stone-boiling in the British Isles,' was referred to in *The Naturalist* for October.

A series of flint implements was exhibited by Mr. W. Dale. These were all obtained from Hampshire, and well illustrate the continuity of the Palæolithic and Neolithic Ages, and support the contention of many archæologists that no hiatus exists between these periods.

Mr. O. G. S. Crawford's paper was an attempt to give a list as complete as possible of bronze axes of French type found in Britain and to point out certain features in the distribution. By such investigations strong evidence is obtained of 'Trade between Britain and France in the Neolithic and Bronze Ages.'

Mr. T. J. Jehu and Mr. A. J. B. Wace gave the interesting results obtained by them in the course of 'Excavations in the Kinkell Cave, St. Andrews.' The cave had been inhabited in Roman and early Christian times. It is unfortunate that the material for the dating of the time of human habitation of the cave is so meagre, but the geological data, i.e., the '25-foot' raised beach, recording an uplift of land after the appearance of Neolithic man, give the earlier limit of the age of the cave, and the 'finds' undoubtedly point to its occupation during Roman times.

An account of the 'Excavations on the site of the Roman town of Viroconium at Wroxeter' was given by Mr. J. P. Bushe-Fox. The site appears to have been inhabited from the earliest days of the Roman conquest. Tombstones of soldiers of the Fourteenth Legion, which left Britain finally in A.D. 70, have been found. Excavations revealed foundations of buildings which appeared to have been large shops with dwelling rooms at the back and verandahs in front. The buildings had undergone many alterations (in one case no fewer than five) during the three hundred and fifty years of the Roman occupation. Over three hundred pieces of the pottery found bear potters' names.* The coins numbered about three hundred, and ranged from Claudius, A.D. 41, to Gratian, A.D. 383. This year a building, probably a temple, has been discovered.

Dr. A. Irving gave a sequel to his communication to the Section in 1911 on the 'Prehistoric Horse Remains in the Stort Valley.'

Mr. F. Smith introduced in his 'Palæolithic Guillotine

* We understand that a card index of these has been made during the course of the excavations, a practice which we should like to hear has been widely adopted by others engaged in similar excavation work.

'Trap-stones,' an ingenious but unconvincing suggestion that certain large pointed stones had been used by prehistoric man for strategic hunting.

'Excavations at the Hill-fort, Parc-y-Meir, Abergele,' by Mr. W. Gardner brings the consideration of the papers dealing with British Archæology to a close.

An account of the preliminary excavation of a cave adjoining that known as La Cotte de St. Brelade, on the south coast of Jersey, during which a Mousterian floor, with characteristic implements, was found, was contributed by Mr. R. R. Maret in 'Recent Archæological Discoveries in the Channel Islands.' Exploration work has also been done at St. Ouens (Jersey), and at L'Islet, St. Sampsons (Guernsey), where a type of dolmen, unusual in the island, is situated. Amongst the smaller finds, which include alleged eoliths and palæoliths, a stone object resembling a mould, found at the neolithic level, deserves mention.

Mr. H. J. E. Peake, by comparing the number and distribution of flat celts and flanged celts in the Lower Rhone Valley with those found in equal areas of Great Britain or Germany, suggests that during the first Bronze Period the people were in a neolithic state of culture. There are indications of a line of trade between the Po Valley and the copper mines of Spain.

Roman Archæology was represented by two papers by Mr. T. Ashby, 'The Via Appia' and 'The Aqueducts of Ancient Rome.' As far as Beneventum considerable remains of the Via Appia still exist, but beyond this town there is considerable doubt about its course. In the neighbourhood of Bari, in the territory traversed by the Via Traiana, which is a continuation of the Via Appia, are the only dolmens and menhirs known in Italy except the group in Terra d' Otranto. A group of four hitherto unknown menhirs close to the road was discovered.

'A Contribution to the Archæology of Cyprus' was made by Mr. J. L. Myres, who is already on his way to make further investigations in the island, which we have strong evidence to regard as one of the great centres of industry of early times.

Two papers were contributed by Professor Flinders Petrie upon Egypt. In 'Recent Discoveries of the British School in Egypt' we have the most complete record yet made of any cemetery, including the exploration of about eight hundred graves. Tarkhan, the scene of the excavations, must be regarded as the pre-Memphite capital of Egypt, and probably the most important centre in studying the earliest historical race (First Dynasty, 5,500 B.C.) of Egypt.

The preservation of these tombs is remarkable, the earliest form of the mastaba and tomb chapel, with the slits for the

soul to come forth to the offerings, and the pottery brought to the grave by the relatives with the food and drink for the dead, are exactly as they had been left over seven thousand years ago. Another site at Gerzah has given good results of the Twelfth and Eighteenth Dynasties. In one large tomb the body of an ancient plunderer was found, crushed by the fall of the roof just as he was about to remove the ornaments, which included a gold pectoral inlaid with coloured stones. At Memphis more statuary and sculptures were found during the clearing of a further acre and a half of the great Temple of Ptah.

The discovery of a remarkable standard measure of Ptolemaic age, engraved on a slab, giving 26·8 inches as the value of a cubit, is important, as this standard was known in Egypt under the Eighteenth Dynasty, and was used in Asia Minor, classical Germany, and mediaeval England. In one mastaba were found a duck and three donkeys buried in full-size human graves. This appears to be a unique find. An important discussion arose out of the material in this paper, relating to the evolution of the dolmen, Professor Elliott Smith suggesting that the type of mastaba was gradually spread along the Mediterranean and eventually became the dolmen now found in Europe and the British Isles, in India and right across the Pacific. Professor Boyd Dawkins and Professor Flinders Petrie expressed the opinion, which we believe is shared by the majority of Egyptologists, that the Egyptian mastaba is not a Megalithic monument at all, and that there is no evidence of a flow of people out of Egypt at any period. There is no necessity to seek unity of origin of a stone monument found in all parts of the world.

'The People of Keftiu and the Isles from the Egyptian Monuments,' by Mr. G. A. Wainwright, contained a summary of the geography and civilization of the Mediterranean about 1500 to 1100 B.C. Brugsch suggested long ago that the Egyptian Keftiu referred to the Hebrew Caphtor, and that both were equivalent to Crete. On subjecting the material, e.g., paintings from Rekhmara, Senmut, and geographical lists from various places, it became evident that the greater part of Keftiuan civilization is not Cretan but Syrian. Hence there is strong support that Caphtor is probably Asia Minor, also that the identification of both Keftiu and Caphtor with Crete has come about owing to the presence of Cretans on the paintings with each of them, these being the people of the Isles with the Keftiuans, and the Cherethites with the Caphtorim or Philistines proper, Keftiu then appears to be Cilicia. The dress of the Keftiuans consisted of a pointed ornamented kilt, which was likened to the ultra-modern slashed skirt.

Miss M. A. Murray's contribution, 'Evidence for the Custom of Killing the King,' concluded the papers relating to ancient Egypt. Frazer's theory of the general practice of killing the king which was not at first received by all, has been triumphantly confirmed by Seligmann's discoveries among the Shilluks of the Nile Valley. The evidence of human sacrifice in ancient Egypt is conclusive. The fundamental belief underlying the sacrifice of the king was that in him the god of fertility was incarnate, and that in his declining days he must be extinguished, so that the deity could pass into a younger and stronger body, thus the god of fertility never suffered decay.

Mr. R. Campbell Thompson contributed an outline of 'A New System of Decipherment of the Hittite Hieroglyphs.' There have been five previous decipherments, all of which show differences. Thompson's system depends upon the application of the names of Hittite and other chiefs of the ninth century to the hieroglyphs, and then with the syllabic values thus obtained, the comparison of the grammar known from the Hittite cuneiform tablets from Boghaz Keui.

African Anthropology was represented by four papers. Mr. E. S. Hartland showed in the 'Historical Value of the Traditions of the Baganda,' that the recent marked tendency to accept at their face values oral traditions of peoples in the lower culture was contrary to true critical principles.

Mrs. Charles Temple shows the great value of Applied Ethnology. We have a striking example set forth in 'Social Organization amongst the Primitive Tribes of Northern Nigeria.' The Government in Northern Nigeria have, in certain cases, embodied native customs in local statutes. A review was given of the custom of those tribes usually called pagan, a misleading title, as in most cases their religion comprises a belief in an all-powerful God, as well as in animism and ancestor worship, but useful to distinguish them from Moslems and Christians.

In 'The Bori Cult in Tunis and Tripoli' Major Tremearne gave a vivid picture of the Hausa ideas of the spirits which people their imaginative minds. The bori of the city are nearly equivalent to the Arab jinns, and are regarded as disease spirits, those of the forest are more nature gods. Generally speaking the bori have human forms but cloven hoofs, but they can assume any form at will. All bori, from Kuri the chief, downwards, move like the wind.

Major Tremearne's second paper, 'Some Notes on Hausa Magic,' is an extension of the former paper. The Hausa resorts to magic for success in love, in agriculture, in hunting, in war, to destroy a rival's prosperity, and to promote trade. The Mohammedan Hausas worship Allah so long as all goes well, but if he fails they have recourse to magic.

Mr. R. Campbell Thompson's paper, 'Ancient Assyrian Medicine,' dealt chiefly with the cuneiform fragments and tablets (about five hundred in number) as yet unpublished in the British Museum. These relate mainly to diseases of the various organs of the body, poultices, and enemas. More than a hundred drugs are given, but it is often difficult to identify them with their modern equivalents. Amongst those identified are liquorice, cassia, 'Heart-plant' as one of the *Hyocyami*, and Mandrake. A great number of the sections consist of simple descriptions of the disease, followed by a brief receipt for the proper drugs and their use, but there are curious lapses into pure magic, with appropriate incantations.

Mr. W. Crooke, 'The Stability of Tribal and Caste Groups in India,' shows that there is less stability in spite of formal rules regulating endogamy and exogamy in the tribal and caste groups than Sir H. Risley supposed to exist. Many of the larger groups are distinctly heterogeneous.

The origin and signification of 'Hook-swinging in India' was discussed by Mr. J. H. Powell. The ceremony, which is still practised in certain villages of Chota Nagpur, consists of attaching the victim by means of two hooks passing through the fleshy part of the back to a cross-pole pivoted on a tall post. The rite is probably a commutated form of human sacrifice. Rotation of the victim (not swinging) seems to be characteristic of the ritual, and recalls a similar feature of the Meriah sacrifice of the Khands.

Mr. W. J. Perry gave a table showing the aim of the practice of 'Orientation of the Dead in Indonesia.' In all the cases investigated (seventeen) the dead are made to face in the direction of the Land of the Dead, which is the direction of the land from which the folk in question believe themselves to have come.

'Sun Cult and Megaliths in Oceania,' by Mr. W. H. R. Rivers contains an account of the seasonal element in the religious ritual of a considerable number of tribes. Evidence of representation of the annual movements of the sun is found among the *Arcois* of Eastern Polynesia, the *Dukduk* of New Britain, the *Matambala* of the Solomon Islands, and other Melanesian peoples.

Some interesting points were raised by Dr. G. Landtman in 'The Ideas of the Kiwai Papuans regarding the Soul.' These people use the same word for soul, shadow, reflection in the water, and picture. The soul may inhabit any part of the body or leave it altogether. A man might steal another's soul by catching his shadow at night with a piece of bamboo open at one end, which he afterwards plugged up. By burning the bamboo the other man is killed. Dreams are attributed to the wanderings of the soul. The soul of a murderer is

supposed to leave his body and haunt the ghost of his victim, and if a person with the gift of seeing 'spirits' watches the two, he may shoot the soul of the murderer and thus account for his otherwise mysterious death. If a man sees his own soul it is regarded as foreshadowing his death.

Miss M. A. Czaplicka read a paper on 'The Influence of Environment upon the Religious Ideas and Practices of the Aborigines of Siberia.' The area dealt with may be divided into two definite geographical districts, the northern 'Arctic' lowland and the southern 'continental' mountain regions. All over Siberia there exists the same shamanistic cult, differentiated by the influence of environment into two types agreeing with the geographical division. Miss Czaplicka's paper illustrates the important doctrine that man's development has always been in one certain direction, as modified by his environment and surroundings.

'On the Differentiation of Man from Anthropoids,' by Professor Carveth Read, endeavoured to show that all the prominent characters, functional and structural, that distinguish man from the anthropoids, are the consequences of his special liking for animal food. If we suppose one of our anthropoid ancestors had a liking for animal food strong enough to lead him to persistently seek it, that this habit was useful by increasing the supply of food, and that it was inherited by his descendants, then by a series of stages differentiation would gradually follow leading up to man.

Dr. H. Campbell, in 'The Factors which have Determined Man's Evolution from the Ape,' argued that this evolution had essentially been mental. It was the abandonment of an arboreal for a terrestrial life, in the search after animal food, which determined man's evolution from the ape. The first employment of crude weapons created a new standard of mental fitness. Other contributory factors were polygamy, inter-tribal wars, and factors influencing the feelings.

Another phase of evolution was dealt with by Dr. Lewis Robinson, who submitted, in 'The Relations of the Lower Jaw to Articulate Speech,' that the characteristic prominent human chin was a necessity for articulate speech, for which the muscles of the tongue alone would not suffice. Professor Elliot Smith maintained that the jaw had not originally any connection with the power of articulating speech, and that man was already provided with the necessary equipment when he first began to speak. It was not the formation of the jaw which made speech possible, but the acquisition of speech which developed those features in the jaw.

The results of the measurements of eight hundred and ninety-two skeletons before the Twelfth Dynasty, accurately dated, and of eight hundred and seven more vaguely dated,

were given by Professor Flinders Petrie in 'Early Egyptian Skeletons.' In the whole series of early skeletons the same series of changes are found. From the early prehistoric times they diminish down to the smallest type, that of the invading minority race of the First Dynasty, when they increase again up to the Sixth Dynasty. The changes are not due to gradual evolution but to racial mixture. The later invasions of Hyksos and Arab show historically how such changes occur. A gradual infiltration goes on for many centuries, until at last a small compact tribe of invaders enters by force and conquers the already mixed populations.

Mr. H. T. Fleure and Mr. T. C. Jones submitted the results of the examination of about two thousand three hundred individuals in 'Ethnography of Wales and the Border,' and gave a list of eleven chief types as a result. Mediterranean types are the fundamental element, and are especially predominant in the valleys of the great moorland areas. Certain features of interest have been noted, thus there are distinctly red-haired individuals, Tregaron (Cardiganshire) being a marked centre for this character. The women are also distinctly darker than the men. There appear to be two distinct coast populations, which is interesting, as the Welsh chronicles speak of dark sea rovers and fair sea rovers. Copies of maps and tabular statements which were circulated at the time the paper was read, showed the results of the survey in a clear manner, and should be referred to by those who wish to analyse the results further.

In conclusion, we can only comment upon the very high order of value and interest of the contributions to Section H at the Birmingham Meeting. As a consequence of this the average audiences were larger than the compiler of these notes has observed before. Many of the papers gave the impression that the threshold to highly important investigations has been crossed, and we look forward to the continuation of the work in all parts of the world, and anticipate very fruitful results at the meetings arranged for Australia (1914) and Manchester (1915).

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At the Bolton-by-Bowland (West Riding) Police Court recently a Preston fish-dealer, and a labourer, also of Preston, were summoned for committing a breach of the Wild Birds Protection Act at Grindleton. Defendants were seen to take from a nest containing five lesser redpolls. When approached by a police-constable they had the birds in their possession. A well-known local ornithologist protested that the Ribblesdale district was being over-run by persons who took wild birds and their eggs. He knew of persons who came from various places, especially Manchester, and stayed in the district several days, with the sole purpose of scouring the district for wild birds. The Chairman, in fining defendants £2 each, said the magistrates wished it to be understood that they were determined to preserve bird life in the locality.

FIELD NOTES.

FLOWERING PLANTS.

Coloured Flowers of *Calystegia sepium*.—The occurrence of anything but white flowers of the Great Bindweed is infrequent. I found several deep pink ones at Cooper Bridge, near Huddersfield, on 13th August, 1913. There were apparently two plants bearing these coloured blooms, situated three or four yards apart and surrounded by a large bed of other plants bearing the usual white blossoms. The situation was a steep bank overhanging the River Colne. The coloured flowers each had narrow veins of white alternating with much broader patches of deep pink, and were large and vigorous—quite as big as any I have ever seen of the normal hue.—CHARLES MOSLEY, Lockwood.

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BIRDS.

Unusual Site for a Flycatcher's Nest.—Last year a Blackbird built its nest on the top of some logs which were reared against the wall in a farmyard at Felliscliff, near Harrogate. This year a Spotted Flycatcher built her nest in the inside of the old nest. It was quite open, without any cover at all.—R. FORTUNE.

Bird Notes from Slaithwaite, S.W. Yorkshire.—I am indebted for the following to Mr. James Bamforth, Wilberlee :—

(1) **ADVENT AND INCREASE IN THE NUMBER OF SWIFTS.**—Twenty years or so ago the Common Swift was not known to stay or breed about Slaithwaite, but was occasionally seen during harvest time, passing over at a great height. For two or three years now they have come to breed in the district, and this season (1913) have been especially numerous, nesting in the cracks and under the slates of some of the mills and at Pole Chapel. One was seen hawking near Slaithwaite Station so late as 25th September. Locally swifts are known as 'ell rakes.'

(2) **MOVEMENTS OF THE COMMON SNIPE.**—On the elevated tableland known as the 'Crimea' (1100 feet), Mr. Bamforth in September shot an example of this bird which had a white metal ring round one of its legs bearing the inscription, 'Wetherby, High Holborn, London.' The bird had been ringed on the 'East Cheshire Hills, 3rd June, 1911.'—WM. FALCONER, Slaithwaite, 8th October, 1913.

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MYRIAPODA.

***Geophilus carpophagus* at Louth, Lincolnshire.**—We have received from Mr. A. V. White, of Louth, Lincolnshire, a specimen of a centipede which he noticed was quite luminous when he picked it up in the dark. Mr. R. S. Bagnall informs us that it is not *Geophilus electricus*, which is rare, but *Geophilus*

carphophagus, a somewhat larger species with fewer pairs of legs. He is satisfied that most records of luminous centipedes in this country refer to the latter species, which is common, especially in uncultivated districts. He has only seen two examples of *electricus*, one from Whitley, Northumberland, and one from Whitby, Yorkshire.—T.S.

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COLEOPTERA.

***Agabus congener*, Pk., and other Beetles in Upper Swaledale.**—In the early part of July I paid a brief visit to Birkdale Tarn, in Upper Swaledale, in search of Coleoptera inhabiting this high region of north-west Yorkshire. Out of a mossy moorland pool by the roadside near Keld I fished up a specimen of *Agabus congener* Pk., together with a few *Hydroporus discretus* Fair. In similar pools in the vicinity *Hydroporus morio* Dej. occurred pretty freely. On the shore of Birkdale Tarn the only beetles to be found were the common *Nebria gyllenhali* Sch., a solitary *Campylus linearis* L., and two species of *H. malota*. These last, however, have turned out to be *H. tibialis* Heer. and *H. eremita* Rye, both of them mountain species and neither appear to have been previously met with in Yorkshire. Another visit to this remote district—little known to the coleopterist—at a more favourable season would, I believe, result in some interesting captures, and well repay the entomologist for the long, though exhilarating, walk over the fells to this upland sheet of water.—M. LAWSON THOMPSON, Middlesbrough.

Coleoptera on Ingleborough.—Early in July I had a day's collecting on Ingleborough. Examining moss in the stream flowing into Gaping Ghyll resulted in *Geodromicus nigrita* Müll. and *Lesteva sharpi* Rye, being taken sparingly, a single *Ischnopoda carulea* Sahl. occurred with them. From under stones a single *Arpedium brachypterum** Gr. was secured with *Pterostichus vitreus* Dj., not uncommonly. Judging from the elytra of *Corymbites aeneus* L., observed under stones, that species must have been plentiful earlier in the season. A welcome *Telephorus paludosus* Fall. settled on a stone I was in the act of turning over. Near the summit *Aphodius lapponum* Gyll. was common in sheep dung, and with it a single *Tachinus proximus* Kr. occurred. Overtaken by a heavy shower when near the base of Ingleborough, I sheltered under an overhanging ledge of rock, and found a small "Staph" slowly crawling on the rock which has since proved to be a specimen of the hitherto unique *Eudectus whitei* Shp.* I am indebted to Mr. E. A. Newbery for his kindness in identifying several of the above species.—E. W. MORSE, Leeds.

* New to the County List.

NOTES ON THE BLUE-GREEN ALGÆ, WITH A KEY TO THE SPECIES OF OSCILLA- TORIA AND PHORMIDIUM.

HAROLD WAGER, F.R.S.

(Continued from page 374).

49. Plant mass slimy, dark olive green **O. nigro-viridis**
Trichomes straight or curved, constricted at joints, fragile; cells 7-11 mic. in diameter, 3-5 mic. long, transverse walls granular; apex tapering, obtuse; apical cell somewhat capitate, outer wall convex and slightly thickened. On piles in salt water, salt marshes, in plankton from West Indies. (G., 217, 6, 20; T., 69, 4, 12.)
49. In plankton from West Indies. (See T., 70, 4, 13-15; West, *J. of Bot.*, 1899.) **O. capitata**
From Greenland. (See De Toni, and T., page 82) **O. subsalsa**
50. Apex of trichome usually straight **O. major**
Stratum membranaceous, mucous, blue-green to dark steel-blue; trichomes 18-23 mic. in diameter, often in narrow bundles; cells 4.5-6 mic. long, transverse walls granular; apex somewhat tapering, obtuse. In stagnant waters, borders of ponds and pools. (T., page 67.)
50. Apex of trichome usually curved **O. pereursa**
Stratum thin, green; trichomes 15.5-18.5 mic. in diameter, cells 4-6 mic. long; transverse walls granulated; apex somewhat tapering, obtuse. (See T., p. 83.)
51. Apex of trichome uncinatate or undulating, slightly constricted at joints **O. lætevirens**
Stratum thin, membranaceous, bright blue-green; trichomes fragile, transverse walls sometimes granular; cells 3-5 mic. in diameter, 2.5-5 mic. long; apical cell not capitate, obtuse, calyptra none. In brackish or salt water; on woodwork under an old mill. (G., 226, 7, 11; T., 78, 4, 28.)
51. Trichomes 4 mic. in diameter, flexuous or coiled, **O. salinarum**
Much constricted at joints, cells nearly or quite as long as broad; apex tapering, slightly curved, obtuse, no calyptra. In salt water ditches. (T., page 77.)
52. Plants in warm or fresh water 60
52. Plants in salt water, epiphytic **P. laysanenae**
Filaments 5-6 mic. in diameter, sheath hyaline, trichomes 4-4.5 mic. in diameter, irregularly curved, rarely straight, not constricted at joints, cells 4-11 mic. long, transverse walls not granulated; apex straight, tapering, capitate; cell contents blue-green. (T., 104, 5, 7-8.)

53. Stratum thin, membranaceous, pale blue-green .. **P. tenue**
 Filaments straight, entangled; sheaths thin, becoming diffuent into a mucus; trichomes 1-2 mic. in diameter, slightly constricted at joints; cells 2.5-5 mic. long; apex straight, or may become curved; apical cell acute conical, not capitate, no calyptra; transverse walls usually indistinct. In fresh water; on pots in a greenhouse, etc. (G., 189, 4, 23-25; T., 98, 4, 63-65.)
53. Stratum thick, impregnated with lime, firm, bluish green to brownish-red **P. crosbyanum**
 Filaments curved, sheaths thin; trichomes 1-2 mic. in diameter, not constricted at joints; cells 1.5-5 mic. long; apex straight, not tapering, not capitate; apical cell conical, no calyptra. Empty sheaths numerous. In salt water. (T., 96, 4, 60-61.)
54. Trichomes more than 3 mic. in diameter 57
 54. Filaments less than 3 mic. in diameter 58
55. Trichome not capitate; apical cell rounded with slightly thickened membrane .. **P. ambiguum**
 Stratum black, yellow-green or blue-green; sheaths firm or diffuent, sometimes thick and lamellose; trichomes slightly constricted at joints; transverse walls rarely granulated; cells 4-6 mic. in diameter, 1.5-2.7 mic. long. In fresh, brackish, or warm water. (G., 189, 5, 10; T., 103, 5, 5.)
55. Trichome not capitate, apical cell conical, obtuse, **P. interruptum**
 Stratum membranaceous, mucous, blue-green; trichomes 5-6.5 mic. in diameter, flexuous; cells 2.5-3.2 mic. long, transverse walls finely granulated. (T., 102, 4, 75.)
56. Stratum thin, membranaceous, pale blue-green or yellow **P. laminosum**
 Filaments flexuous, not constricted at joints, entangled; sheaths narrow papery or amorphous; cells 1-1.5 mic. in diameter, 2-4 mic. long; four refringent granules on transverse walls; apical cell acute conical, not capitate, no calyptra. In hot springs and sulphur waters; in a greenhouse, on rocks moistened by water, etc. (G., 187, 4, 21-22; T., 90, 4, 62.)
 Var. weedii, see Tilden, page 97.
56. Stratum thin, scarlet **P. rubrum**
 Filaments straight; trichomes 1 mic. in diameter, fragile, not constricted at joints; cells 1-1.2 mic. long, transverse walls rarely visible. Thermal. (T., 95, 4, 58.)
57. Trichomes 6-8 mic. in diameter **O. boryana**
 Stratum dark, velvety, lead-coloured; trichomes spiral or straight and uncinat at apex, constricted at joints; apical

- cell rounded or pointed, no calyptra; cells 4-6 mic. long; transverse walls with fine granules. In a stream of warm water near a hot spring. (G., 234, 7, 22-23; T., 83, 4, 37-38.)
57. Trichomes 4-4.5 mic. in diameter **O. violacea**
 Stratum membranaceous, dull green or lead-coloured; trichomes straight, tangled; cells shorter than the diameter, transverse walls granular; cell contents violet or sky-blue; apical cell drawn out to a point, conical. In fresh water, in greenhouses. (T., 79, 4, 31.)
58. Plants in hot, brackish or salt water 59
58. Plants in fresh water **P. subuliforme**
 Stratum lamellose, yellowish-green; trichomes 2-2.8 mic. in diameter, straight, constricted at joints; cells 6-8 mic. long; apex tapering, bent or twisted, not capitate; apical cell more or less acute, no calyptra. (G., 169, 4, 26; T., 99, 4, 67.)
59. Stratum mucous, lamellose, yellowish or dark blue-green **P. fragile**
 Trichomes 1.2-2.3 mic. in diameter, more or less flexuous, constricted at joints; cells 1.2-3 mic. long; apex tapering; apical cell acute conical, no calyptra. In hot or brackish water. (G., 163, 4, 13-15; T., 93, 4, 52-53.)
59. Stratum delicate, rose-coloured, velvety **P. persicinum**
 Sheaths diffuent; filaments loosely entangled; trichomes 1.7-2 mic. in diameter, much constricted at joints; cells 2-7 mic. long; apex tapering; apical cell acute conical, no calyptra. In salt or brackish water, forming a delicate film on shells, roots, etc. (G., 164; T., 94.)
60. Apex of trichome especially capitate, transverse walls with well-marked double rows of granules **P. favosum**
 Stratum thick or papery, frequently forming a layer on wood and stones in streams; trichomes 4.5-9 mic. in diameter, more or less flexuous, not constricted at joints; cells 3-7 mic. long; sheaths usually not present; apex gradually tapering, calyptra obtuse. On wood in water troughs, under mill-wheels, etc. (G., 180, 5, 14-15; T., 104, 5, 9-10.)
60. Apex of trichome slightly capitate, transverse walls not granular **P. calidum**
 Stratum thin, membranaceous, dark green; trichomes 6-8 mic. in diameter, straight, not constricted; apex tapering, straight; cells of trichome 3-8 mic. long; sheaths absent; calyptra conical depressed. In warm or fresh water; on rocks. (G., 182, 5, 16; T., 105, 5, 11.)
61. In salt water **O. subliformis**
 Stratum dull green; trichomes elongate,

flexuous, not constricted at joints; cells 4.7-6.5 mic. in diameter, 4.7-6.5 mic. long; apex tapering; apical cell obtuse (may be 10 mic. long), not capitate; no calyptra. In salt marshes, brackish ditches and pools, etc. (G., 226, 7, 10; T., 77, 4, 27.)

61. In fresh water **O. nigra**

Stratum somewhat membranaceous, often floating, dark olive-green or black; trichomes straight or slightly flexuous; cells 8.5 mic. in diameter, 8.5 mic. long; apex tapering, obtuse rounded; transverse walls distinctly granulated. In stagnant waters; on moist cliffs above high tide. (T. 70.)

62. Trichomes slightly constricted at the joints, . . **O. formosa**

Stratum dark blue-green; trichomes elongate, flexuous, transverse walls sometimes finely granulated; cells 4-6 mic. in diameter, 2.5-5 mic. long; apex tapering, obtuse, curved. Floating in water in tufts, or on mud at bottom; in greenhouses; on dripping rocks, etc. (G., 230, 7, 16; T., 80, 4, 33.)

62. Trichomes not constricted 63

63. Apical cell rounded **O. animalis**

Stratum blue-green; trichomes straight, fragile, not constricted at joints; cells 3-4 mic. in diameter, 1.6-5 mic. long; transverse walls with granules here and there; apex tapering, no calyptra. (G., 227, 7, 13; T., 79, 4, 30.)

63. Apical cell sub-acute **O. brevis**

Stratum olive green; trichomes fragile; not constricted at joints; inflated refringent cells here and there; cells 4-6.5 mic. in diameter, 1.5-2.8 mic. long, transverse walls not granulated; apex tapering, subacute, uncinat, not capitate. In marshes and pools and on damp earth. (G., 229, 7, 14, 15; T., 79, 4, 32.)

Var. *neapolitana*, see G., page 229.

64. Trichomes 2.7-3.3 mic. in diameter **P. molle**

Stratum mucous bright blue-green; trichomes straight or nearly so, moniliform; cells 3-7.8 mic. long, protoplasm with large granules; sheaths not coloured blue by chlor-zinc-iodide; apex not tapering, not capitate, no calyptra. On leaves of *Potamogeton*, etc. (G., 163, 4, 12.)

64. Trichomes 1.7-2 mic. in diameter **P. luridum**

Stratum membranaceous, purple on surface, grey or blue-green underneath; filaments nearly straight, entangled; trichomes fragile, slightly constricted at joints; cells 1.8-4.7 mic. long, not granular; apex not curved, not tapering, rounded, no calyptra. In fresh water. (G., 165, 4, 17-18; T., 95, 4, 56-57.)

65. Trichomes not capitate, transverse walls not granular 66
65. Trichomes especially capitate, transverse walls with well-marked granules. (See No. 60.) .. **P. favosum**
66. Stratum thick, compact mass, or tufted, bright blue-green, sometimes lead coloured .. **P. retzii**
- Filaments straight, fragile, sometimes moniliform, usually not; trichomes 4.5-12 mic. in diameter, cells 4-9 mic. long; cell contents granular (metachromatin granules), transverse walls not granulated; central body (nucleus) clearly visible especially when stained; apex straight, not capitate, apical cell truncate, with scarcely thickened membrane. The plant is of frequent occurrence in still and running water in limestone districts, and is an excellent type for cytological study. (G., 175, 5, 6-9; T., 102, 5, 1-4.)
- Var. fasciculata. Tufted, floating, in rapidly running water; not moniliform.
- Var. rupestris. In still water; moniliform, especially near the apex.
66. Stratum thin, dark blue-green .. **O. minnesotensis**
- Trichomes much constricted at joints, not tapering, not capitate; cells 2-5 mic. in diameter, 2-4 mic. long; apical cell rounded, no calyptra. On sides of a quarry under dripping water. (T., 75, 4, 21.)
66. Stratum amorphous, gelatinous, fibrous, in the meshes of a sponge; salt water .. **P. spongeliæ**
- Trichomes brownish-red, much constricted at joints; hormogones frequently attenuate at each end; cells 7.5-8.5 mic. in diameter, 2.7-7.3 mic. long; apex rounded, no calyptra. (G., 161, 4, 8-10.)
67. Cells shorter than the diameter **O. cruenta**
- Stratum dark purple; cells 4-7 mic. in diameter, 2-4 mic. long; transverse walls granular; apex obtuse, straight or slightly curved. (T., page 80.)
67. Cells equal in length to or longer than the diameter 68
68. Stratum thin, beautiful blue-green; cell contents pale blue-green **O. amphibia**
- Trichomes 2-3 mic. in diameter, straight or curved, fragile, not constricted at joints; cells 4-8.5 mic. long, transverse walls with two granules; apex not tapering, not capitate, no calyptra. In fresh water, cold or warm, on rocks, damp soil, in effluent from filter beds, etc. (G., 221, 7, 4-5; T., 73, 4, 19, 20.)

(To be continued).

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The *Museums Journal* for October contains a paper on 'Methods of Collecting,' by Mr. Sheppard, which makes one wonder whether curators possess consciences.

Naturalist,

NEWS FROM THE MAGAZINES.

Mr. H. J. Turner writes on 'Butterflies Drinking,' in *The Entomologist's Record* for September.

The Irish Naturalist for October is almost entirely occupied by an account of the Flora of the Saltees, a group of islands off the south coast of county Wexford.

In *The Zoologist* for September, Mr. J. C. Moulton writes on 'The first reliable account of the Orang-utan,' and Mr. G. Bolam records Grey Lag Geese in Cumberland.

In the *Church Times* for 19th September the Rev. J. C. V. Durell describes a night visit to Spurn. The journey was possible by the aid of the full moon. He says, 'this was not by accident, but by careful arrangement'!

In the *Journal of Conchology* for October, Mr. J. R. B. Masefield describes a scalariform variety of *Helix aspersa* in which the whorls were absolutely separated in the form of an elongated cornucopia. In consequence of the retractor muscles being atrophied or undeveloped, the animal was able to entirely leave the shell without apparent discomfort.

After criticising 'the Wesleyans' for not 'making themselves acquainted with well-known facts before they write,' in the natural history section of their magazines, *The New Nature Study* for August states 'the upper chalk contains irregular hard, blackish or whitish nodules composed mainly of silica: this is flint.' The chief characteristic of the upper chalk, in the North of England at any rate, is that it is flintless.

The Museums Journal for August is principally occupied by a report of the Hull Conference of the Museums Association, and the President's address. There is also a group of the members, taken on the Burton Constable excursion, and a life-like portrait of the retiring president. The September number is largely occupied by a paper entitled 'The Showing of Museums and Art Galleries to the Blind,' by Mr. J. A. C. Deas, of Sunderland.

We know of the toad that hatches his wife's eggs on his back, but now Professor Arthur Thomson tells us in *Knowledge* of a fish, discovered in a New Guinea river by the explorer Lorentz, which is a rival as regards its parental care. On the head of the male there grows a kind of bony loop, and to this in some way or other, though it is not known how, a wreath of eggs is attached. Each egg has a quantity of filaments, over a hundred in number, which unite into strings and form a cylindrical band.

In *The Entomologist's Monthly Magazine* for October, Mr. J. Edwards describes *Bythinus puncticollis* Denny = *validus* Aubé, and *B. distinctus* Chaudoir = *securiger* Denny *nec* Reich. He also points out that a *Bythinus* described and figured by Denny as *Arcopagus glabricollis* is apparently *B. clavicornis*. In the same journal Mr. K. G. Blair writes on *Tribolium castaneum* Herbst. = *ferrugineum* Auct. (*nec* Fab.), and Mr. N. H. Joy points out that 'It is quite evident that under the name *Nantholinus ochraceus* Gyll., we have confounded two very distinct species.'

Part 6 of Volume 3 of '*Old Love Miscellany of Orkney, Shetland, Caithness and Sutherland*'; issued by the Viking Society, contains many interesting notes of general interest, as well as a paper on 'Some Lost and Vanishing Birds of Fair Isle,' by Mr. G. W. Stout. Another note records that the Sea Eagle has not nested in the Orkneys for many years, and as regards Shetland, 'no young have been reared for a long time, 'and it is very doubtful if at the present moment there is a pair of Sea Eagles in Shetland.' Naturalists may also find interest in endeavouring to identify some of the representations of animals on the 'Early Christian Monuments of Caithness,' which are illustrated.

NORTHERN NEWS.

We regret to notice the announcement of the death of Mr. Herbert Druce, the entomologist.

Professor J. W. Judd has been elected Emeritus Professor of Geology in the Imperial College of Science and Technology.

Sir Archibald Geikie has been elected a member of the Standing Committee of the British Museum in the place of the late Lord Avebury.

Mr. C. Carus-Wilson has favoured us with a copy of his paper 'On the presence of Copper in the Sandstone at Exmouth,' which was read at the Birmingham meeting of the British Association.

We have received a photograph of a large case of sea-birds—about 70 in number—consisting of Guillemots, Razor-Bills, Puffins, etc., and a description of the 'Case illustrative of Nesting Colonies of Sea-birds on the Yorkshire Cliffs,' recently presented to the Museum at Batley by the Hon. Curator, Mr. W. Bagshaw. There is a view of the Bampton Cliffs at the back of the case, but the 'rocks' upon which the birds are placed are certainly a bit 'rocky.'

The year 1914 being the centenary of the birth of the late Sir John Lawes and 1917 that of Sir Henry Gilbert, it is proposed to collect the sum of £12,000 to erect a suitable Commemoration Laboratory at the Rothamsted Experimental Station, where additional accommodation is badly needed. It is understood that if half of this sum is raised by public subscription the other half can be obtained as a Grant from the Development Fund. An appeal is therefore made for £6,000.

On the instigation of the Yorkshire Naturalists' Union, Harry Kirk, a young farmer of Scruton, Yorks., was fined for offering for sale two owls, the species being protected by the Wild Birds' Protection Act, and a farmer named John Sanderson, of Sedbergh, who had been offering peregrine falcons for sale, was recently fined for having two birds in his possession. His defence was that he bought them from a man who had taken them from Cautley Crag, and if he had not bought them they would have been killed on account of the damage they did. It was alleged that they had been known to take lambs away.

In a paper read at the Birmingham meeting of the British Association on 'Harbour Projections and their Effect upon the Travel of Sand and Shingle,' Mr. Ernest R. Matthews suggested that in order to modify this trapping of the sand, the ground plan of the harbour, instead of showing the piers to run out at right angles to the coast, or approximately so, should show that on the side facing the direction of the travelling material to project from the coast at an angle of 45°, the additional area thereby enclosed by the harbour piers could be utilised, among other purposes, for that of wharfage. The travelling material would, he stated, pass round the harbour projection if the plan of the harbour was on these lines, and would supply the coast on the lee side of the harbour with a natural protection of sand and shingle.

Filey is again becoming famous. The latest discovery was recently made by a diver while searching for wreckage *in deep water* off Ravenscar. 'He came upon a broad flight of stone steps. These, five in number, were of red sandstone, fourteen feet wide, all being firmly fixed by Roman concrete. They were carefully examined, and each step was found to be "footworn in the centre."' Why in the centre only, of a 14-foot step, it is difficult to say. And seeing that there has certainly been no change of level here since Roman times, it is difficult to understand how they could have been well worn in the centre, in deep water. Five steps fourteen feet wide, all cemented together, could hardly have fallen into the water from the cliff top without damage. Anyway, the Press gives particulars of the archæological achievements of the diver's father, so we presume the report must be correct!

THE LOST TOWNS OF THE YORKSHIRE COAST

And other Chapters bearing upon the
Geography of the District.

By THOMAS SHEPPARD, F.G.S., F.R.G.S., F.S.A.(Scot.).

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NOTES AND COMMENTS.

A MUSEUM GUIDE.

We have seen various and numerous Guides to Museums, but we think one of the most interesting, and one of the best illustrated, is the General Guide to the Exhibition Halls, American Museum of Natural History, New York, which has been sent to us by Dr. F. A. Lucas, the Director. The authorities at the American Museum have presented the more interesting features of the collections under their charge in a



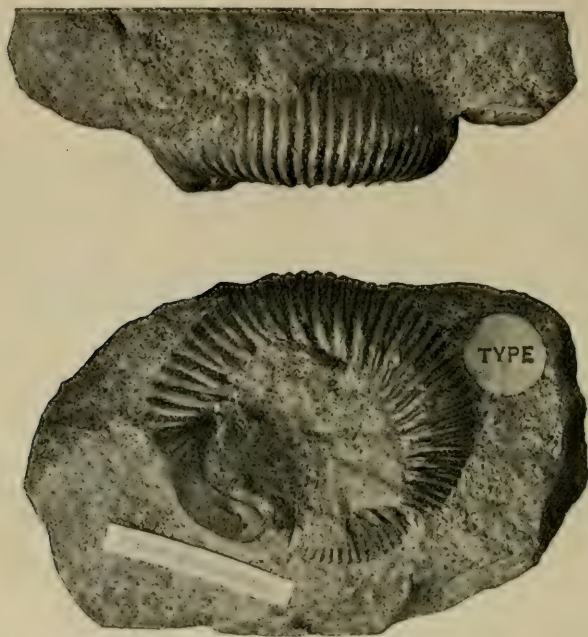
'This largest and most formidable fish, living or extinct, of which we have any record, frequented the coast of South Carolina in Tertiary time. The jaws measure nine feet across; estimated length of fish, eighty feet, as large as a sulphur-bottom whale.'

popular way. We are kindly permitted to reproduce one of the illustrations.

AMMONITES BRAIKENRIDGII.

The interesting specimen shewn in the adjoining illustration is figured in part 10 of *Yorkshire Type Ammonites* by Mr. S. S. Buckman, to whom we are indebted for its loan. It shews an unusually perfect termination or lip. This specimen is from the Ironshot Oolite of Dundry. Although the species is not a Yorkshire type, yet as *Am. braikenridgii* has been claimed as a Yorkshire species (Morris and Lycett, 1850), it is

important to prove that the claim was not justified. Other species figured and described in this publication are:—*A. transformatus*, *defossus*, *regularis*, *gagateus*, *latescens*, *pinguis*, *retusus* and *validus*.



Ammonites braikenridgii.

A YORKSHIRE SCHOOL OF GEOGRAPHY.

The Yorkshire Summer School of Geography, organised this year by the University of Leeds, has completed a successful inaugural session. More than a hundred students were in residence for three weeks at and near Whitby, the headquarters being in the new buildings of the County School. Systematic instruction in the methods of modern geographical study was aimed at by choosing Yorkshire as a representative area, and studying as exhaustively as possible all the factors and relationships connected with its structure and location. A course of five lectures on the physical and special geological features of the district was given by Professor Kendall, together with lectures on the North Sea, and on Meteorology, by Mr. A. Gilligan. This led to the study of special topics of industrial or historical character, including plant distribution and agriculture; metalliferous and coal mining; the textile

and metallurgical industries, ports, fisheries, and communications; prehistoric Yorkshire; the Roman occupation; Saxon and Danish Yorkshire; mediæval Yorkshire; architecture; place-names and languages; Old Whitby as a port, and river development. The course concluded with two lectures on the teaching of geography by Mr. W. P. Whelpton. The practical work included the reading and enlargement of topographical maps, the examination of typical rocks, the making of models and microscope sections, field surveys, and the reading and construction of meteorological charts. Frequent excursions were made to places of geological and industrial interest in the neighbourhood, and an afternoon was devoted to the study of a typical Yorkshire farm, with large-scale plans showing the rotation of crops on each field for the past four years.

—: o :—

Yorkshire Marine Mollusca.—Since writing the account of the marine mollusca of the Yorkshire Coast, chiefly as represented in the Hull Museum, for the meeting of Yorkshire Naturalists at Hull, in December last,* I have found several new species which I have added to the Hull collection. In some shell sand which I got at Scarborough on December 7th, of 1912, I found *Lepton nitidum* v. *psidiale*, *Eulima bilineata*, *Astarte sulcata*, *Nuculana tenuis*, *Goodallia triangularis*. Also in examining some shell sand from Bridlington, obtained on March 7th of this year, I found *Lepton nitidum* v. *convexum*. These two varieties of *Lepton nitidum* are remarkable for their very curious and beautiful sculpture. Neither they nor *Nuculana tenuis* appear to have been hitherto recorded for our coast. Besides these, while looking through some unsorted *Odostomias* obtained at Scarborough at the annual meeting of the Marine Biological Committee in 1911, I found a rather worn specimen of *Rissoa inconspicua*. This species, though I have found it in abundance at Torbay, does not appear to have been found on this coast before. It is not unlike some forms of *Rissoa parva* v. *interrupta*, but may be distinguished, inter alia, by the peculiar sculpture and the pink tip of its spire. In shell-sand obtained at Filey, August 31st, I discovered a fragment of *Philine angulata*, a shell not, I think, recorded before on the Yorkshire Coast, and in shell-sand from Scarborough, September 23rd, a rather broken specimen of the beautiful *Montacuta substriata*. I have also added a specimen of *Eulimella nitidissima* obtained from Scarborough, February 13th, 1912, and confirmed the identification of *Pyrgulina decussata*, which was already in the museum under that name, but which I had not given in the Hull list.—F. H. Woods.

* See Trans. Hull Sci. and Field Nat. Club, Vol. 4, pt. v. pp. 231-250.

ECOLOGICAL NOTES ON TWO SOUTH YORKS. MARSHES.

H. H. CORBETT, M.R.C.S.

AMONG the few remaining bits of unreclaimed marsh that are still to be seen in the low-lying land to the east and north of Doncaster, are Askern Bog or Askern Mather, adjoining Sutton Common, and Kilham Marsh, near Cantley. These, although similar in many points have yet so much that is distinct in their respective plant associations that comparison is interesting.

The bog at Askern is formed by the water from springs issuing from the Permian limestone rocks that here rise somewhat steeply from the level clay-covered ground of Sutton Common. The water of the springs is charged with lime, both in solution and suspension, and this mingling with the clay and vegetable humus makes a marly soil. Artificial drainage has now rendered the greater portion of the common fit for grazing, but a considerable area is still uncultivated. The bog is divided longitudinally by a long, narrow and irregularly shaped pool. The western portion, between the Askern to Doncaster road and the pool, has a sulphur water well near the middle. By the gate near the pump keeper's cottage is some cultivated ground which soon yields place to rank marsh vegetation consisting of *Phragmites communis* and *Spiraea Ulmaria*. Following this on the pool side is an alder scrub, while nearly all the rest of the marsh, except the margin of the pool, is dominated by *Juncus obtusiflorus*. This rush, usually considered rare, grows in such dense profusion that one can walk on it dry shod where the surface of the ground is covered with water. Sub-dominant in the juncus marsh are:—*Spiraea Ulmaria*, *Carex Goodenowii*, growing in large patches, *Molinia cærulea*, *Galium uliginosum*, and *Hydrocotyle*.

Crossing the juncus marsh is a broad belt of *Glyceria aquatica* with clumps of *Epilobium hirsutum*, marking the site of an old drain. Each side of the belt is fringed with *Iris Pseudacorus*. Scattered over the marsh, but less abundant than the plants already mentioned are:—*Thalictrum flavum*, *Cnicus palustris* and *Lychnis Flos-cuculi*; while many other species occur among which are *Parnassia palustris*, *Orchis latifolia* and *Schoenus nigricans*. Dividing the juncus marsh from the pool margin is a narrow alder scrub with *Lysimachia vulgaris*, *Lythrum Ealicaria* and *Rubus dumetorum* as sub-dominant. Here below the alders is also a rich profusion of *Lastraea Thelypteris*. Between the alders and the pool is a wide water-logged swamp, usually too wet to be investigated, but

during such dry seasons as the past summer, parts of it can be explored. Here *Juncus obtusiflorus* is still dominant, but the ground is disputed by *Carex riparia*, *C. vesicaria*, and *Cladium Mariscus*, while *Lythrum Salicaria* and *Rumex Hydrolapathum* are strong contestants.

On the eastern side of the pool is a clayey field with patches of *Iris Pseudacorus* in the wetter parts, together with *Enanthe Lachenalii* and *Juncus obtusiflorus*, the latter being far less prominent here than on the other side. Scattered over the field is much *Senecio aquaticus*. Near the pool is a narrow belt of old alders, beneath which are *Viburnum Opulus* and *Rhamnus Frangula*. The edge of the pool is densely fringed with *Cladium* together with which are large masses of *Carex riparia* and *vesicaria*. Along with these are *Scirpus Tabernaemontani* and *Typha angustifolia*. Among the less prominent plants on this side of the pool are *Anagallis tenella* and *Triglochin palustre*. In connection with the latter plant, it is worthy of note that the little tortricid moth, *Eupocilia vectisana* is common on the bog. Its usual habitat being salt marshes on the coast where the larva feeds on *T. maritimum*. This, together with *S. Tabernaemontani* and *Carex distans* which occurs at Askern, suggests recent marine influence.

The marsh at Kilham has a soil somewhat different from that at Askern. It is the remnant of one of the numerous 'fleets' that prevailed around the level of Hatfield Chase previous to Vermuyden's draining. The old bed of the river Torne, which is now confined to an artificial course, meandered through the marsh and was bounded on both sides by low banks of blown sand and gravel derived from the subjacent Bunter. Now the marsh occupies the left side of the river and is almost a quarter of a mile long and from a hundred to a hundred and fifty yards wide. Coarse pasture, chiefly *Agrostis canina*, *Aira caespitosa* and *Dactylis*, studded throughout with low bushes of *Crataegus*, the latter supporting *Rosa canina* var. *dumalis*, *Lonicera* and *Rubus rusticanus*, occupy the dryer pastures, while the marsh itself is dominated by *Glyceria aquatica*. Following the swamp from the upper to the lower end one finds the grass land gradually changing to a juncus marsh, the dominants being *J. conglomeratus* and *J. effusus*, with *J. lampocarpus* in the wetter part. Along with these are *Iris Pseudacorus*, *Carex* of several species, *Glyceria aquatica*, *Achillea Ptarmica* and *Senecio aquaticus*. This association gradually changes to *Glyceria aquatica* and *Carex vesicaria* with *Eriophorum angustifolium* and *Menyanthes* as sub-dominants. Along with these is *Enanthe fistulosa*, and, what appears to be a strange member of the association, *Briza media*. The rest of the marsh is entirely dominated by *Glyceria aquatica*, with the exception of the wettest part where it yields place to *G. fluitans*.

A comparison of the associations of the two marshes shows the following differences :—

ASKERN.	KILHAM.
Dominant—	Dominant—
<i>Juncus obtusiflorus.</i>	<i>Glyceria aquatica.</i>
Sub-dominant—	Sub-dominant—
<i>Cladium Mariscus.</i>	<i>Glyceria fluitans.</i>
<i>Rumex Hydrolapathum.</i>	<i>Juncus effusus.</i>
<i>Lastræa Thelypteris.</i>	<i>Juncus conglomeratus.</i>

Other species occurring in one locality but not in both :—

ASKERN.	KILHAM.
<i>Thalictrum flavum.</i>	<i>Ranunculus Lingua.</i>
<i>Rhamnus Frangula.</i>	<i>Stellaria palustris.</i>
<i>Parnassia palustris.</i>	<i>Menyanthes trifoliata.</i>
<i>Enanthe Lachenalii.</i>	<i>Orchis incarnata.</i>
<i>Galium uliginosum.</i>	<i>Potamogeton lucens.</i>
<i>Anagallis tenella.</i>	<i>Scirpus setaceus.</i>
<i>Orchis latifolia.</i>	
<i>Potamogeton coloratus.</i>	
<i>Scirpus Tabernaemontani.</i>	
<i>Schoenus nigricans.</i>	

Volume I., part 3, of the **Proceedings of the Prehistoric Society of East Anglia** (London: H. K. Lewis, pp. 245-382, 3s. 6d. net); edited by Mr. W. G. Clarke, contains a wealth of papers, illustrated by a truly remarkable series of plates, while most of the papers deal with the pre-history of East Anglia, some deal with later periods, and areas as far off as Cornwall and Australia. Dr. Allen Sturge writes on the Drayton Theory and striated neoliths, the editor describes some Barnham palæoliths. Mr. Hall writes on flint harpoon barbs, Mr. Howard on the Eolith problem, Mr. Reid Moir defends the 'Humanity' of early Ipswich implements, Dr. Marr on a late Palæolithic site near Thetford, etc. Dr. Marie Stopes figures the well known Red Crag shell portrait, and upon this a special committee held an inquest, a most elaborate report on which is given, but the verdict is 'not proven.' We think the editor might purchase a blue pencil before the next part appears. Much expense in printing would then be saved without decreasing the value of the papers.

Transactions of the Hull Scientific and Field Naturalists' Club, Vol. IV., Part v., 1913, pp. 231-280 (Plates). Hull: A. Brown & Sons, Ltd., 2s. net. Besides the Secretary's Report on the work of this Club in its various sections, the Transactions just published contain a few papers of more than ordinary interest, and well illustrate the extensive sphere of this Club's work. The Rev. F. H. Woods gives a complete and comprehensive account of the 'Marine Mollusca of the Yorkshire Coast' as represented in the Hull Museum, where Mr. Woods' collection can be seen. It is a valuable contribution. Mr. G. Sheppard follows with an illustrated account of the chalk fossils in the same institution, his paper apparently being a further instalment of a catalogue of specimens therein. The Editor, Mr. Thos. Sheppard, F.G.S., gives a detailed account of a remarkable series of Anglo-Saxon relics from a cemetery recently discovered at Hornsea. These date from the fifth century A.D., and include the associated relics found with twelve burials. This paper is exceptionally well illustrated. We are glad to see that since this Society commenced publishing Transactions it has strictly confined its published papers to those bearing upon the area around the Humber, the Club's sphere of work.

THE COLEOPTERA OF BISHOPDALE, YORKS.

W. E. SHARP, F.E.S.

So thoroughly has the Coleoptera Committee of the Yorkshire Naturalists' Union recognized its responsibilities and performed the work assigned to it, that even the most recklessly optimistic stranger could hardly anticipate, by a few days' collecting in any part of Yorkshire, to add to the list of beetles already recorded as occurring in that county. Yet because the 'dales' have been by no means exhaustively explored entomologically, and because the ebb and flow of insect life is at all times and in all places so remarkable and so unexplained, I venture to relate the species of Coleoptera encountered within the space of two days during last July in the vale of Bishopdale.

To describe Bishopdale adequately would be as difficult as probably to the majority of the readers of *The Naturalist*, it would be superfluous. A lateral valley of Wensleydale, branching off to the south-west, where the Ure, brown from the peat of its upland moors, comes down over those steep tabular steps which constitute the falls of Aysgarth. To gain it one wanders on to the scattered grey village of Thoraby, and marks on the sky-line the short steep escarpment and the long undulating line of hills that characterize the Yoredale series of the great Yorkshire Carboniferous area. A stream runs sinuous down the centre of the valley between the rich lowland pastures that furnish the dairies where is made the cheese for which Wensleydale is famous, and far in the distance the long grey lines of the quiet fells converge and carry the road over into Upper Swaledale. Such is an imperfect vision of Bishopdale.

The investigation of its beetles is a different matter. At first sight the dale does not strike the coleopterist as a land of especial promise. A few copses, principally of larch, hang about the sides of the long valley, and the course of the stream is marked by a discontinuous line of alders and willows, but the lowland pastures are too good to allow of much uncultivated ground—marsh and wilderness, where grow the special plants and live the special beetles that inspire the coleopterist's quest.

However, by the courtesy of Colonel Lodge, a local landowner, whose kindness in this matter the present writer is glad to have the opportunity of acknowledging, access, otherwise unobtainable, was granted to some of the best localities for the collection of insects which the dale affords.

Although the wide margins of road and lane were deep in herbage, including masses of a beautiful blue geranium (*G. pratense*), reminiscent of the Wiltshire chalk downs, the sweep-net

was an almost useless implement, common roadside beetles being conspicuous by their absence, but this paucity must be ascribed less to the poverty of the locality than to causes beyond our present knowledge which seem to have operated over the whole of this country during the summer of the present year. In fact the only species noted in the sweep-net were *Anaspis frontalis*, *Liosoma ovalulum*, *Apion hæmatodes*, and *A. humile*, *Malthodes mysticus*, *Sitones hispidulus*, *S. sulcifrons*, and, where fir trees overhung the road, *Cyphon padi*. Beating was, if possible, still more futile; in fact the only bushes to be beaten were the willows and alders of the stream, and these produced nothing. The methods of collecting, indeed, ultimately resolved themselves into shaking out over large sheets of brown paper the lower layers of the haycocks which studded the mown grass-land all down the dale, searching among the shingle and in the wet moss of the stream, and finally, tearing in pieces the still thicker moss which bordered the mountain rivulets in the higher levels of the valley.

All these methods yielded beetles, principally of the most abundant and universally distributed species. For instance, one pulled a haycock to pieces, shook out its damp lower parts, and found *Pterostichus vulgaris* and *P. strenuus*, *Amara communis* and *Trechus obtusus*, *Patrobis excavatus* in abundance, *Philonthus decorus*, *Stenus speculator*, *S. similis* and *S. unicolor*, *Tachinus rufipes*, *Choleva tristis* and *C. granæicollis*, and such smaller beetles as *Typhæa fumata*, *Cryptophagus affinis*, *Atomaria ruficornis* and *A. fuscata*, *Enicmus minutus*, *Megasternum bolitophagum*, *Homalium rivulare*, such common *Homalotæ* as *H. circellaris*, *H. atramentaria* and *H. fungi*, and among the *Rhynchophora*, *Eirrhinus acridulus* and *Rhinonchus pericarpinus*, while perhaps not quite so familiar to the eye of the southern coleopterist were *Tachinus collaris* in abundance, *Barynotus elevatus*, *B. schönherri*, and *Tropiphorus tomentosus*. Then we attacked the stream, and here perhaps the most interesting capture of the expedition was made. In one locality, where the bank was a little steep and formed of light soil, one noticed the subterranean burrows and little heaps of ejected sand, like the tracks of some microscopic mole, made by a *Bledius*. Carefully excavating these with the point of a penknife, the beetle was discovered within perhaps half an inch of the surface. It proved to be *Bledius gulielmi* Shp., a species hitherto only recorded from the banks of a stream near Middlesbrough and added to the British list from those examples.

Searching among the shingle produced none of the *Bembidia* usually common in such localities, but *Helophorus arvernicus*, *H. brevipalpis*, *H. viridicollis*, and *H. aquaticus*, *Dryops*

Ernesti, *Elmis æneus*, *Anacæna globulus* (quite black form), *Limnebius truncatellus*, and, under half-submerged stones, *Platambus maculatus*.

Proceeding further up the valley, and following one of the affluents of the main stream where it comes down steep and, turbulent, from the high fells, we can investigate those semi-aquatic *Brachelytra* whose home is the thick wet moss that clothes the boulders over which the water rushes or trickles. And perhaps few methods of collecting beetles are on a hot, summer's day, more enjoyable than this. High up among these solitudes, where, beside the voice of rushing waters, the only sounds that break the silence of the hills is the wail of the Curlew and the bleat of sheep on distant fells, too high for alder or willow, and too steep for the vegetation which encumbers the lower reaches of the stream, one makes a little basin of carefully-arranged stones, and then, stretched at full length on the short warm turf by the water's edge, tears off the dripping moss which grows thick on the great stones and rocks over which the water runs, and, holding it submerged beneath the cool water of the little basin one has made, pick out with a small paint-brush the beetles as they come floating to the surface and transfer them to the laurel bottle. So here we took *Diänous cærulescens*, *Stenus guynemeri*, *Quedius umbrinus*, *Homalota elongatula*, *Gnypeta cærulea*, and every British species of *Lesteva* except those recent additions to our list, the southern *L. fontinalis* and the Hebridean *L. luctuosa*. It was perhaps a little late for *Q. auricomus*, a beetle always to be found in such a habitat earlier in the year. These 'submerged moss' beetles are a small group very specialized in their economy, mostly of northern range, but they are generally common in Wales and extend into Devonshire.

There remained only to examine the much thicker moss which grows in the boggy hollows of the little ravine excavated by the stream. This one has to pull in pieces over a folding sieve—an almost indispensable part of the coleopterist's outfit. In this way were taken *Myllæna brevicornis* in numbers, *Lathrobium punctatum*, *Quedius attenuatus*, *Othius myrmecophilus*, and, very commonly, *Homalota islandica* (*cremita* Brit. Cats). Here also was taken *Arpedium brachypterum*, a species usually attached to much higher elevations.

Little else remains to be told. One should, perhaps, mention *Hylesinus crenatus*, found in a rotten ash-tree lower down the valley, and an odd specimen of *Throscus obtusus* swept up on the way back to Thoraby. Fungus of any kind was singularly scarce, even in the woods, and the only beetle that allowed itself to be recorded therefrom was the very common *Cis boleti*. With further time more might doubtless have been discovered in these woods by careful examination of bark and

dead leaves. This task must, however, be left to the next coleopterist who visits Bishopdale, and the only apology for the above list of captures, meagre as it is, must be that it represents the results of a quite average two days' July collecting in one of the perhaps less-known dales of Yorkshire.

The Annual Report of Proceedings under the Salmon and Freshwater Fisheries Acts, etc., etc., for the year 1912, has recently been issued by the Board of Agriculture and Fisheries. London: Wyman and Sons, 9½d. It contains 72 pages and a map, with much information of service to anglers and naturalists.

Volume XXIV., Part 5, of the **Proceedings of the Geologist's Association** contains the Presidential Address of Dr. John W. Evans, on 'The Wearing Down of Rocks.' He deals with effects of variations in temperature, frost action, the mechanical action of running water, and the eroding action of ice, the last being by far the largest section of the address.

In Vol. 6, Part 6, of Series 2, of the **Annual Report and Proceedings of the Belfast Naturalists' Field Club** we notice papers on 'The Botanists of the North of Ireland,' by Canon Lett; 'Some Geological Features of Scotland and their relation to North of Ireland,' by Dr. A. R. Derryhouse; 'The Gorges of the Tarn,' by Mr. A. M'I. Cleland, and 'Geological Observations in North East Londonderry,' by Mr. J. R. Kilroe.

The Huddersfield Naturalist and Photographic Society, Annual Report and Balance Sheet, 1912-1913 (24 pp., 6d.) shows a good balance in hand. Messrs. C. Mosley, A. C. Ellis, J. H. Carter, E. Fisher, W. E. L. Wattam, J. W. H. Johnson, and Dr. Woodhead are the contributors. There is an illustrated obituary notice of the late H. G. Brierley, and Mr. Johnson contributes an illustrated account of 'The Sewage Fly,' with figures of *Psychoda sexpunctata* and *P. phalænoides*.

The Annual Report for 1912 of the Scarborough Philosophical and Archæological Society, contains the report of the Scarborough Field Naturalists' Society. The work of the latter is divided into sections, the year's work in each being recorded by Messrs. J. G. Brewin, W. J. Clarke, A. Harman, A. S. Tetley, E. C. Horrell, D. W. Bevan, E. B. Cramp, E. A. Wallis, J. Irving, A. I. Burnley, F. Bentham, L. Wright, A. E. Peck and T. B. Roe. The reports are very creditable.

Among the papers in the **Memoirs and Proceedings of the Manchester Literary and Philosophical Society**, Vol. LVII., Part 2, we notice 'The Specification of the Elements of Stress,' by R. F. Gwyther; 'Black Pottery from the Gold Coast and Ashanti,' by W. Burton; 'A Criticism of Some Modern Tendencies in Prehistoric Anthropology,' (a very reasonable appeal for moderation), by the late W. H. Sutcliffe; 'The Structure and Life-History of *Leptosphaeria Lemnææ*,' by W. B. Brierley, and 'On Some Abnormal Specimens of *Dictyota dichotoma*,' by H. S. Holden.

The Transactions of the Yorkshire Numismatic Society (Vol. I., pt. 3, pp. 27-85. Hull: A. Brown and Sons, 1s.) contains a list of the Yorkshire Seventeenth Century Tokens (illustrated); the Kingston Mint; the Coins of the Knights of St. John of Jerusalem at Malta; an Unpublished Bradford token; Roman coins found near Leeds; the Hornsea token; and notes on a recent find of coins in the River Hull. The contributors are Messrs. H. B. Earle Fox, G. L. Shackles, T. Pickersgill, and the editor, Mr. T. Sheppard. There are many illustrations. The membership of the society has more than doubled during the year.

LAND AND FRESH WATER MOLLUSCA IN NORTH-WEST ICELAND.

HANS SCHLESCH.

DURING July this year, I spent a week in the interior of Isafjörður, in North West Iceland, examining the hot springs there, and investigating the molluscan fauna of the district.

This portion of Iceland is geologically the oldest part of the island, and is divided by many long, narrow and deep fiords, separated by steep rocks reaching from 1,000 to 2,000 feet in height. In this part travelling is exceedingly difficult, and the



Map of North-West Iceland.

paths and roads are so poor that only the Icelandic ponies can get a footing. Therefore the district has to be visited by boats, and this is rendered unpleasant and often dangerous by the sudden storms which arise. Here and there in this district are numerous small circular lakes, which have been traced back to the glacial period.

The hot springs, for which the district is famous, occur near the beach. One near the farm Kelda by Mjofafjörður rises at a height of nearly 400 feet.

On Reykjanes I found living examples of *Limnæa geisericola* in water with a temperature of 45 degrees C. Near the Armula farm, in the vicinity of the great Dranga, and in the Heidalur valley by Mjofafjörður are fairly large bushes of birch, and on the ground near these I found *Vitrina angelica*, *Conulus fabricii*, *Vertigo arctica* and *Succinea groenlandica*.

Mr. Sikes* records *Helix arbustorum* and *Pisidium casertanum*

* Non-Marine Mollusca of Iceland. *Journ. of Conch.*, April, 1913.

from Isafjord, but I have not yet found this species. *Limnaea geisericola* lives probably in all the hot springs round Iceland.

The following is a list of the specimens recorded, and the localities.



Hek Springs, Reykjavik, Isafjord, Iceland.

	Heidalur	Kelda	Reykjavik	Laugaból	Laugalaud	Armula	Kaldalon	Isafjordur
<i>Agriolimax agrestis</i>							×	×
<i>Vitrina angelica</i>	×					×	×	×
<i>Hyalinia radiatula</i>								×
<i>Hyalina alliaria</i>								×
<i>Conulus fabricii</i>	×					×	×	
<i>Helix arbustorum</i> v. <i>alpestris</i>								×
<i>Helix arbustorum</i> v. <i>trochoidalis</i>								×
<i>Vertigo arctica</i>	×					×	×	×
<i>Succinea groenlandica</i>						×		×
<i>Limnaea geisericola</i>		×	×	×	×			
<i>Limnaea ovata</i>				×	×			
<i>Limnaea truncatula</i>					×			
<i>Pisidium obtusale</i>					×			×

THE LITTLE BUNTING AT WHITBY: AN ADDITION TO THE AVIFAUNA OF YORKSHIRE.

THOS. STEPHENSON,
Whitby.

A MALE example of the Little Bunting (*Emberiza pusilla*) was captured on the Airy Hill Farm, near Whitby, on October 6th, by Frank Hutchinson, a local bird-catcher, while catching linnets. It was with a flock of linnets and other small birds. Previously the weather had been very stormy with a strong easterly wind. Mr. Wm. Eagle Clarke identified the bird, which is an addition to the Yorkshire avi-fauna. The Whitby Literary and Philosophical Society have acquired the specimen, which will be placed in the local collection at the museum.

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YORKSHIRE BRYOLOGISTS AT DONCASTER.

C. A. CHEETHAM.

THE Bryological Section of the Yorkshire Naturalists' Union met at Doncaster on 1st November, and, thanks to Dr. and Mrs. Corbett, who made all necessary arrangements, they had a very successful and interesting time. The way chosen was by the side of the Don to Sprotborough, the limestone crags yielded some good finds, and Mr. W. Ingham was kept well employed in determining, as far as possible, the species of both mosses and hepatics. The most important were *Barbula tophacca*, *Weisia verticillata*, *Fissidens pusillus*, *Eurhynchium tenellum*, *Metzgeria furcata*. Further along, on old tree trunks, *Aulacomnium androgynum*, with characteristic gemmæ, was found, then a stubble field was investigated and some minute species added to the list, viz., *Pottia truncatula*, *P. minutula*, *Phascum cuspidatum*, *Riccia glauca*. Soon after this the inspiration of the excursion, *Tortula cernua*, in its only present known British station, was found, and the why and wherefore of its occurrence hotly debated. With it, curiously enough, the alien moss, *Leptobryum pyriforme*, was in some quantity. This is generally looked on as an escape from greenhouses, but that explanation cannot be used for *T. cernua*, as this has never been recorded from hothouse or similar situations. *Plagiothecium depressum* was seen on limestone blocks, and *Tortula ambigua* on soil in the quarries. In all about fifty species of mosses and ten hepatics were noted, and a list has been supplied to the Doncaster Society for their records.

After tea a short meeting was held, and Mr. W. Ingham gave an account of the day's proceedings. A vote of thanks was passed to Dr. and Mrs. Corbett. The next meeting will be held at Jackdaw Crag Quarry, Tadcaster, on 6th December, the party starting from Tadcaster Station at 10-45 a.m. Tea will be at Calcaria Farm about 4 p.m.

YORKSHIRE ENTOMOLOGISTS.

THE Annual Meeting of the Entomological Section of the Yorkshire Naturalists' Union was held in the Leeds Institute on Saturday, October 25th, nearly forty members and associates being present. Mr. W. Falconer occupied the Chair. Exhibits were numerous and varied, comprising species representing most of the orders of the Insecta, many of them of exceptional interest. Each was described by the exhibitor, and then passed round for inspection. Coleoptera were brought by Dr. Fordham and Messrs Thompson, Cribb, and Bayford. The last-named also exhibited on behalf of Mr. E. C. Horrell a large number of species of exceptional interest, including many melanic forms and several examples of asymmetry. Of Lepidoptera was a short series of *L. marginata* shown by Mr. Hooper, while of *A. caja* a few slight variations occurred in series shown by Messrs. Cocker, Hooper, Whitaker, and Wright, Mr. W. Dyson passed round an interesting form of *B. quercus* var. *callunae* from the Penistone Moors; one of three similar specimens he had bred, in which the pale band shaded gradually into the darker colour of the wing. Dr. Smart showed a curious hybrid between *N. zonaria* and *N. hispidaria* and a fine melanic form of *A. rufina*, among many other interesting specimens. Mr. Hewett exhibited *D. galii*, and Mr. Porritt a fine series of *A. grossulariata* var. *nigro-sparsata* bred from wild Huddersfield larvæ. One case of especial interest was submitted by Mr. B. Morley, and contained a number of lepidoptera from the Skelmanthorpe district, as well as the ichneumons with their cocoons, which had been bred from them. In one case not only the host and parasite but a hyperparasite also were to be seen.

A pupa of *S. carpini* from which the imago should have emerged last spring and was still in an apparently healthy condition, despite the fact that three ichneumon cocoons had been removed from the larger cocoon which contained it was shewn by Mr. Barraclough of Low Moor. A discussion ensued as to whether or not an insect which had been attacked in the larval state by ichneumons ever reached the perfect state. Dr. Croft brought several interesting cases of Alpine species. Hymenoptera were shown by Messrs. Roebuck, Musham, Bradley and Bayford, and Trichoptera by Mr. Craven. In Grthoptera Mr. Porritt exhibited the three rare species *Forficula lesnei*, *Apterygida albipennis* and *Decticus verrucivorus* taken by him in East Kent in September, and Mr. Bayford showed a specimen of *Periplaneta australasiae* which had been imported into Barnsley in bananas. In Arachnida the President showed a number of Harvest mites.

The election of officers for the ensuing year then took place. At the evening meeting reports for the year were submitted by the secretaries of the various sections, and approved. Professor Garstang kindly gave a hearty invitation to members to inspect the collection of Lepidoptera recently acquired by the University of Leeds, which was gladly accepted. A paper on 'Asymmetry in Coleoptera,' with special reference to the specific identity of *Notiophilus 4-punctatus* Dej., was read by Mr. Bayford. The argument which was illustrated by means of diagrams and specimens shewing both asymmetry and unequal coloration, tended to prove that *N. 4-punctatus* was at most an extreme variety of *N. biguttatus*. A short discussion ensued.

The President, Mr. Falconer, read a paper on 'Harvest Mites or Harvestmen,' and exhibited all the species (15) found in the country. Structure, and habits, means of offence and defence were each in turn lucidly described. Special attention was drawn to the power these creatures possess, in common with crustaceans, of throwing off a limb, a fresh one growing to replace the one cast off. Cases had been observed where only one out of the full complement of eight legs remained.

Votes of thanks were accorded to Messrs. Bayford and Falconer for their contributions, and to the Leeds members for providing the room.—E.G.B.

Naturalist,

NOTES ON THE BLUE-GREEN ALGÆ, WITH A KEY TO THE SPECIES OF OSCILLA- TORIA AND PHORMIDIUM.

HAROLD WAGER, F.R.S.

(Continued from page 406).

68. Stratum thin, cob-webby, yellowish green; cell contents orange or yellowish green .. **O. chlorina**
Trichomes 3.5-4 mic. in diameter, straight or curved, fragile, not constricted at joints; cells 3.7-8 mic. long, transverse walls not granular; apex not tapering, no calyptra. In stagnant water; on decaying vegetable matter in water. (G., 223; T., 75, 4, 22.)
69. Trichomes .6 mic. in diameter; cell contents light blue-green **O. angustissima**
Stratum expanded, blue-green; trichomes not constricted at joints, flexuous, entangled; cells .9-1.2 mic. long, transverse walls not distinct; apex not tapering, not capitate. In ponds. (T., 76.)
69. Trichomes 1-1.5 mic. in diameter; cell contents yellowish green **O. subtilissima**
Trichomes solitary or scattered, rarely in a yellowish-green mass, straight or circinate; cell walls inconspicuous. (T., 74.)
70. Sheath visible **P. naveanum**
Stratum thin, dull green to olive brown; filaments 15-18 mic. in diameter; sheaths wide, firm, colourless; trichomes frequently interrupted; cells two or three times shorter than the diameter, indistinct. In pools; on marshy grounds, etc. (T., 102, 4, 76.)
70. Sheath not visible 71
71. Trichomes straight **O. limosa**
Stratum dark blue-green; trichomes straight, not constricted at joints, transverse walls frequently granular; cells 11-20 mic. in diameter (commonly 13-16 mic.), 2-5 mic. long; apex straight, not at all or scarcely tapering for a short distance, not capitate; apical cell convex, with slightly thickened walls. In quiet or gently-moving water. (G., 210, 6, 13; T., 65, 4, 6.)
71. Apex of trichome uncinatate or lax spiral **O. curviceps**
Stratum light or dark blue-green; trichomes straight below, not constricted at joints; cells 10-17 mic. in diameter, 2-5 mic. long, transverse walls sometimes granular; apex not or scarcely tapering, not capitate; apical cell convex, sometimes slightly thickened. In quiet or gently-

- moving water; on moist ground, etc. (G., 213, 6, 14; T., 67, 4, 7.)
72. Stratum black **O. margaritifera**
 Trichomes curved, constricted at joints; cells 17-29 mic. in diameter, 3-6 mic. long, transverse walls granular; apex slightly tapering, capitate, calyptra slightly convex. Marine. (G., 216, 6, 19; T., 69, 4, 11.)
72. Stratum dull red **O. miniata**
 Trichomes constricted at joints (?); cells 16-24 mic. in diameter, 7-11 mic. long; apex briefly tapering, obtuse, capitate, calyptra convex. Marine. (G., 216; T., 68.)
73. Stratum dark blue-green. (See No. 71.) **O. limosa**
73. Trichomes solitary; colour inconspicuous **O. decolorata**
 Solitary trichomes among other species of Oscillatoria, 12-13 mic. in diameter, not attenuate, not capitate, not constricted at joints; cell contents reticulate with minute granules; cells a little shorter than the diameter; apical cell hemispherical. In fresh water, Barwell Load, Cambridge, associated with *O. proboscidea* and *O. splendida* (G. S. West). (See De Toni, page 153.)

GLOSSARY.

- Agglu'tinated** (Lat. *agglutino*, I glue), sticking together as if glued.
- Amorph'ous** (Gr. *morphe*, form, *a*, without), shapeless, not regular in form.
- Atten'uate** (Lat. *attenuatus*, thinned), narrowed, tapering.
- Calyp'tra** (Gr. *kalyptra*, a veil), a cap, or thickening of the cell membrane, frequently found at the apex of a trichome.
- Cap'itate** (Lat. *capitatus*, having a head), applied to trichomes with a more or less well-marked constriction at the apex and forming a globose or hemispherical, sometimes conical, head.
- Chro'matin** (Gr. *chroma*, colour), a substance contained in the nucleus which readily takes up certain aniline and other dyes, and becomes deeply stained. It is characterized by containing phosphorus in organic combination and is probably very largely concerned both in reproductive and in vegetative activities.
- Chromat'ophore** (Gr. *chroma*, colour, *phoreo*, I carry), plastids carrying the colouring matters in a plant cell, e.g., the chlorophyll granules.
- Cir'cinnate** or **cir'cinate** (Lat. *circino*, I make round), coiled or rolled up from one end.
- Cyanophy'ceæ** (Gr. *kuanos*, cornflower, blue, *phukos*, seaweed), the blue-green Algæ.
- Cyanophy'cin** (Gr. *kuanos*, cornflower, blue, *phukos*, seaweed), a term applied to granules which take a characteristically bright red colour in carmine, found chiefly on the transverse walls of the cells of the blue-green algæ. They are probably some kind of reserve substance.
- Cy'toplasm** (Gr. *kutos*, a hollow vessel, *plasma*, moulded), the semi-fluid, viscid substance in which the nucleus is embedded contained in the cells of both animals and plants. It is a complex mixture of organic chemical compounds.
- Diff'luent** (Lat. *diffluens*, dissolving), in a state of solution or fluidity.

- Ep'iphyte** (Gr. *epi*, upon, *phuton*, a plant), a plant growing upon another, but not as a parasite.
- Fascic'ulate** (Lat. *fasciculus*, a little bundle), clustered together in small bundles.
- Fil'ament** (Lat. *filamentum*, *filum*, a thread), a fine thread, the trichome together with its sheath.
- Het'erocyst** (Gr. *heteros*, different, other, *kustis*, a bag), cells larger than the neighbouring cells which occur here and there on the filaments of some algæ, the function of which is unknown.
- Hor'mogone** (Gr. *hormos*, necklace, *gonos*, offspring), portions of the trichome, consisting of one or more cells which are separate from the rest, and ultimately develop into new trichomes or filaments. The trichomes are sometimes completely broken up into these reproductive homogones.
- Indura'ted** (Lat. *induratus*, *induro*, to make hard), hardened.
- Lam'ellose** (Lat. *lamellatus*, made up of thin plates), in layers.
- Mam'millose, mam'millate** (Lat. from *mammilla*, dim. of *mamma*, a breast), with nipple-like projections.
- Membrana'ceous** (Lat. *membrana*, membrane), thin, semi-transparent, papery.
- Metachro'matin** (Gr. *meta*, with, beyond, *chroma*, colour), a term applied to deeply-stainable granules which are found in the cells of the blue-green algæ (and in other plants), especially in the central body. They are partly composed of nucleic acid and may have some relationship with the nucleus or nuclear chromatin, possibly being derived from it.
- Monil'iform** (Lat. *monile*, a necklace, and *forma*, shape), trichome like a string of beads. (See **torulose**.)
- Myxophy'ceæ** (Gr. *muxo*, mucus, *phukos*, seaweed), an earlier name than Cyanophyceæ for the blue-green algæ, and now frequently adopted. It refers to the mucus-like or gelatinous masses and layers which these plants frequently form.
- Nu'cleus** (Lat. a kernel), a more or less spherical body, composed largely of a substance called chromatin, and having a complex structure, embedded in the cytoplasm of the cell. In the blue-green algæ the central body corresponds to the nucleus.
- Phycocy'anin** (Gr. *phukos*, seaweed, *kuanos*, cornflower, blue), the blue colouring matter contained in the cells of the blue-green algæ along with the chlorophyll.
- Pilif'erous** (Lat. *pilus*, a hair, *fero*, I bear), bearing a hair or hairs.
- Pro'toplasm** (Gr. *protos*, first, *plasma*, moulded), the viscous, semi-fluid, more or less granular substance contained in the cell consisting of the nucleus and cytoplasm.
- Refring'ent** (Lat. *refringens*, *refringo*, to break up), possessing the quality of refracting or bending the light rays. The cells in which this occurs present a bright, glistening appearance under the microscope.
- Schizophy'ceæ** (Gr. *schizo*, I split, *phukos*, sea-weed). Algæ which increase by fission. Fission-algæ, a name sometimes given to the blue-green algæ.
- Terebri'form** (Lat. *terebra*, a borer, *forma*, shape), like a screw.
- Tor'ulose** (Lat. *torulus*, from *torus*, a protuberance), having the cells swollen laterally, giving the trichomes an appearance somewhat like a string of beads (moniliform).
- Tri'chome** (Gr. *trichoma*, a growth of hair), the row of cells in a filament, considered apart from the sheath.
- Trun'cate** (Lat. *truncatus*, shortened), rounded off and slightly flattened at the apex.
- Un'cinatè** (Lat. *uncinatus*, hooked), curved at the end like a hook.

INDEX TO SPECIES.

The first column of figures 'G.', gives the page in Gomont's monograph; the second column, 'T.', the page in Tilden's monograph; and the third column, 'F.', the page in Forti's 'Sylloge Myxophycearum,' on which a description of the species will be found.

OSCILLATORIA.	G.	T.	F.
<i>acuminata</i> Gom.	227	78	177
<i>agardhii</i> Gom.	205	62	149
<i>amphibia</i> Ag.	221	73	169
<i>amæna</i> (Kuetz.) Gom.	225	77	175
<i>anguina</i> Bory	214	68	159
<i>angustissima</i> W. and G. S. West	—	76	171
<i>animalis</i> Ag.	227	79	178
<i>beggiatoiformis</i> Gom.	235	—	189
<i>bonnemaisonii</i> Crouan	215	68	159
<i>boryana</i> Bory	234	83	188
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<i>var. neapolitana</i> (Kuetz.) Gom.	229	80	181
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<i>var. anguina</i>	233	—	186
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<i>cruenta</i> Grun.	—	80	182
<i>curviceps</i> Ag.	213	67	157
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<i>limosa</i> Ag.	210	65	154
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<i>miniata</i> Hauck.	216	68	160
<i>minnesotensis</i> Tilden	—	75	—
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<i>nigro-viridis</i> Thw.	217	69	161
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<i>proboscidea</i> Gom.	209	64	152
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<i>rubescens</i> de Candolle	204	—	148
<i>salinarum</i> Collins	—	77	176
<i>sancta</i> Kuetz.	209	64	153
<i>var. æquinoctialis</i> Gom.	210	65	154
<i>var. caldariorum</i> (Hauck.) Lag.	210	65	154
<i>simplicissima</i>	219	—	165
<i>splendida</i> Grev.	224	76	173
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OSCILLATORIA—contd.					G.	T.	F.
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<i>crouani</i> Gom.	175	—	240
<i>favosum</i> (Bory) Gom.	180	104	245
vars. <i>a</i> and <i>b</i>	181	—	—
<i>foveolarum</i> (Mont.) Gom.	164	94	221
<i>fragile</i> (Menegh.) Gom.	..	..	..	..	163	93	220
<i>incrustatum</i> (Næg.) Gom.	..	..	..	..	170	99	230
var. <i>cataractarum</i> (Næg.) Gom.	..	..	..	..	170	100	231
<i>interruptum</i> Kuetz.	..	..	..	..	—	102	228
<i>inundatum</i> Kuetz.	..	..	..	..	172	100	232
<i>laminosum</i> (Ag.) Gom.	..	..	..	..	167	98	225
var. <i>weedii</i> Tilden	..	..	..	..	—	97	226
<i>laysanense</i> Lemm.	..	..	..	..	—	104	245
<i>lucidum</i> Kuetz.	..	..	..	..	179	—	243
<i>luridum</i> (Kuetz.) Gom.	..	..	..	..	165	95	222
<i>molle</i> Gom.	..	..	..	..	163	—	219
<i>naveanum</i> Grun.	..	..	..	..	—	102	228
<i>papyraceum</i> (Ag.) Gom.	..	..	..	..	173	101	237
<i>persicinum</i> (Reinke) Gom.	..	..	..	..	164	94	220
<i>purpurascens</i> (Kuetz.) Gom.	..	..	..	..	166	95	223
<i>retzii</i> (Ag.) Gom.	..	..	..	..	175	102	241
var. <i>fasciculatum</i> Gom.	..	..	..	..	177	103	243
var. <i>rupestris</i> (Kuetz.) Gom.	..	..	..	..	177	103	242
<i>rubrum</i> Tilden	..	..	..	..	—	95	223
<i>setchellianum</i> Gom.	..	..	..	..	190	108	254
<i>spongeliæ</i> Gom.	..	..	..	..	161	—	218
<i>subfuscum</i> Kuetz.	..	..	..	..	182	105	247
var. <i>a</i>	..	..	..	..	189	—	—
var. <i>b</i> , <i>joannianum</i> (Kuetz.) Gom.	..	..	..	..	184	106	248
<i>submembranaceum</i> (Ard. and Straff.) Gom.	..	..	..	..	180	104	244
<i>subuliforme</i> Gom.	..	..	..	..	169	99	230
<i>tenue</i> (Menegh.) Gom.	..	..	..	..	169	98	227
<i>tinctorium</i> Kuetz.	..	..	..	..	162	94	218
<i>toficola</i> Gom.	..	..	..	..	171	—	232
<i>treleasei</i> Gom.	..	..	..	..	—	96	234
<i>umbilicatum</i> Gom.	170	—	231
<i>uncinatum</i> (Ag.) Gom.	184	106	250
<i>valderianum</i> (Delp.) Gom.	167	98	223

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The late Dr. H. Franklin Parsons dealt with 'Plant Growth and Soil Conditions' in his presidential address to the Croydon Natural History and Scientific Society, which is printed in the Society's Proceedings and Transactions.

BOOKS ON NORTHERN TOPOGRAPHY.

Walks around Bradford, illustrated, 5th edition. Bradford: W. Byles and Sons, 70 pp., 6d. net. This contains a series of articles dealing with places in the Bradford district, reprinted from *The Yorkshire Observer*. There is a one page index, on the front of which appears an advertisement for a cafe, so that even the index is lost when we tear the advertisement out.

Odd Corners in English Lakeland. Rambles, Scrambles, Climbs and Sport, by **William T. Palmer**. London: Skeffington and Son, 186 pp., 2s. 6d. net. This may be described as a better class guide book, rather better bound and printed than the average guide book, and on thicker paper. There are also fifteen good illustrations, one of which we are permitted to reproduce (plate XIX.). Besides dealing with methods of 'getting about,' reference is made to hills not often climbed, dangerous Lakeland, Wild Life on the Uplands (ravens, peregrines, ferns, etc., though very briefly touched upon), the Martindale deer, angling, winter sports, native sports, etc. Mr. Palmer says 'one cannot deal with the buntings, fieldfares, and other birds which come from the Arctic 'fjelds' to our own fells for the winter, but one may add that it is not unusual to see gulls, chiefly of the black-headed variety, high up our mountains. Indeed this species, *with the black-headed variety*, has been known to nest erratically.'

Lancashire. A descriptive account of the County Palatine. By **Ernest Evans**. London: Longmans, Green and Co., xii. + 167 pp., 1s. 6d. net. Though this little volume, by a natural science master, and presumably for the use of scholars, is intended to cover the various 'ologies' demanded by modern books on geography, it is rather too much biassed in favour of geology. Still there is no doubt its perusal will result in a better understanding of the structure and present appearance of the interesting county between Cheshire and the Lakes. The author is perhaps the least at home when speaking of primitive man. It is hardly likely that the flint for making his implements would be obtained from chalk 'while on hunting expeditions in Yorkshire,' as the Yorkshire chalk flints were not suitable for the purpose. The illustrations of the Bronze-age weapons on page 125 are absurd, and evidently the author has not quite grasped what is meant by the Early Iron-age. There are several maps, though it is difficult to understand why, in addition to the figure number and the description, there should be in each case 'George Philip and Son, Ltd.," and 'Longmans, Green and Co., London, New York, Bombay and Calcutta.'

Memorials of Old Nottinghamshire. Edited by **Everard L. Guilford**. London: George Allen and Co., pp. xiv. + 354. 15s. net. This is a welcome addition to the Memorials of the Counties of England Series, some of the volumes of which we have previously had the pleasure of referring to. The present work is well up to the excellent standard already attained. Among the contributors are the leading authorities in their respective studies, the names of Hamilton Thompson, Rev. J. Charles Cox, J. A. Gotch, Bernard Smith, Aymer Vallance, John Russell, the editor, and others being a guarantee of accuracy. The volume does not profess completeness; as the editor rightly points out several books might be written on the many-sidedness of this interesting shire. But it forms a valuable collection of essays. Among the subjects dealt with are Mediaeval Church Architecture, Newstead Priory and Religious Houses, Ancient and Modern Trent, The Forest of Sherwood, Roods, Screens and Lofts, the Civil War, Poets, Spires, Low-side Windows, and Clockmakers. There is also a particularly good account of the Nottingham and Newark Mints, with plates shewing Saxon pieces, Newark Siege pieces, seventeenth century tokens, etc. The illustrations are particularly numerous and good, and there is an unusually good index.



[Alan Craig,

A Mountain Rock-Pool.

Photo by

Place-Names of South-West Yorkshire. By **Armitage Goodall.** Cambridge: University Press, 1913, pp. viii. + 314., price 7s. 6d. net. This is one of the most scholarly volumes that we have read for some time, and contains much of interest to the naturalist, antiquary and historian. The area dealt with is really that part of the West Riding which lies south of the Aire from Keighley onwards, and in this limited area no fewer than 1,500 names are enumerated, and each in the fullest manner possible. Nor is each dealt with by the usual guess-at-the-simplest methods of some so-called philologists. The author has carefully studied the old forms of each place-name, with, in many instances, rather startling results. For example, Golcar, (which *might* by some thought to be the place of the gold car or golden chariot), formerly rejoiced in such names as Gouthelagh-charthes, Gouthlacharwes, and Goullakarres! The derivation of the names York and Whitby are given as shewing two different ways in which names have been changed from Celtic times onward. 'It is interesting to note that quite a number of places are designated by a simple tree-name. In the south-west Yorkshire the examples include Crabtree, Ewes (yews), Hessele, Lighthazels, Oakes, Popples (Poplars), Thickhollins, Thorn and Thornes. Chief among the wild animals was the wolf, referred to in at least eight names, such as Woolley, Wooldale, Woolrow and Woolgreaves. The hart has also given rise to several names, among them Hartcliff, Hartley, and Harthill. The two places called Earnshaw bear witness to the former appearance of eagles, and the two called Brockholes to the presence of the badger, which formerly was called the brock. The rearing of cattle had a very important place in the rural economy. Shepley, Shipley, and Shibden are so called from the rearing of sheep; Swinden Swinton, and Swinnow, from the keeping of swine; Horsfall and Horsehold from the keeping of horses. We are reminded by Hardwick and Hardcastle of the herds once sheltered there, and by Storfold and Stoodley of important stud-farms. Near Halifax there is evidence of the cattle-rearing energies of our forefathers in the place-names Cruttonstall, Hep-tonstall, Rawtonstall, Saltonstall and Wittonstall, while such a name as Bellhouse may perhaps point to the means by which a great army of farm servants was controlled.' The notes on 'Halifax' are peculiarly interesting. Mr. Goodall will have none of the holy-face nor holy-hair business, and brings in Hallikelf and Bellyfaxe to show that Halifax is Scandinavian, and means 'the shelving land overgrown with rough grass.' The author has not been able to resist the question of the site of the battle of Brunanburh, and suggests that the site was near Brinsworth, between the Rother and the Don.

Vegetation of the Peak District, by **C. E. Moss, B.A., D.Sc., etc.** Cambridge University Press, pp. x. and 235. 12s. net. 1913. The author of this work is well known to our readers, and his reputation as an ecologist is wide and well deserved. Since the publication of the 'Vegetation of the Leeds and Halifax District,' in which he was associated with Dr. Wm. G. Smith, rapid progress has been made in the study of British Vegetation. This is strikingly brought out in the present volume which deals with an area immediately to the south of the one above-mentioned. The work was commenced in 1903 and has been completed several years, but the difficulties of publication have resulted in an unfortunate delay. Meanwhile the circumstances which called forth Tansley's 'Types of British Vegetation,' led to the publication of many facts dealt with in the present volume and perhaps rendered parts of it unnecessary, still we think a wise course has been followed in retaining the original form of the work. A glance at its pages shows it to be much more than a local study, as the frequent comparisons made with the vegetation of other areas renders it a useful text book of ecology. The 'Peak District' covers an area of 432 square miles, includes portions of five counties and varies in altitude from 300 feet to 2088 feet., a large part of which consists of the unenclosed moorlands of the southern Pennines. An introductory chapter deals with

the general topographic, edaptic and climatic factors affecting plant distribution within the area and then follow chapters on the chief plant associations, viz. :—woodland, scrub, grassland, rocks and screes, marsh and aquatic, moorland and cultivated land. In each association the characteristics of the habitat are fully discussed and representative lists of species given. Appendices deal with the relations of the plant communities and a summary of the British plant formations and associations; there is also a copious bibliography. The distribution of the chief associations is admirably shown on two clear, well-printed maps on the one-inch-to-the-mile scale. There are also small maps showing the subsoils and small comparative maps of the plant associations and contours of Cressbrook Dale. A number of excellent photographs, mostly by Mr. W. B. Crump, illustrate the chief plant societies. In a work of this kind there is much room for differences of opinion and as the author rightly points out the limits of the associations would be variously interpreted by different workers. Perhaps the most debatable line is that separating the heather moor from siliceous grassland, where the two merge into each other in a very puzzling way. Several points call for criticism, but only a few can be dealt with in this notice. Referring to the distribution of the Bilberry (p. 188) he says of one writer that he 'appears to think that the occurrence of the bilberry may perhaps always indicate the site of former forest.' On looking up the reference we find the following to be the original statement :—'can it be that its present distribution represents, to some extent at any rate, the position of previous open forest.' It is difficult to see what useful purpose is served by such misrepresentation. On p. 57 he says 'that the water content of the so-called meso-pteridum is higher than the so-called xero-pteridum . . . is not established.' We believe it is not only established, but is easily demonstrated. The implication that the bare peaty summit of Black Hill, Holme Moss, is due to natural retrogression (p. 191) is hardly borne out by facts. The origin of this peculiar and interesting feature is the severe burning which occurred there nearly 50 years ago. Has not the name Soldiers' Lump (p. 190) been transferred by the author from Black Hill to the Peak? These, however, are small points, and detract little from the work as a whole, which will long serve as a model for the study of vegetation. We hope the book will meet with such success as will encourage the publishers to issue similar memoirs dealing with other parts of Great Britain.

The East Riding of Yorkshire. By **J. L. Brcekbank.** Oxford: Clarendon Press, 1913, pp. 256. 2s. 6d. net.

It can be stated without fear of contradiction that there have been more books published in recent years, bearing upon the various phases of East Yorkshire's history, than has been the case with any similar area in the British Isles. These vary from Mr. Mortimer's magnificent volume on pre-historic remains and numerous books on geology, natural history and antiquities, to Morris's admirable 'Little Guide.' In addition, there is the recent Victoria History, as well as many monographs published by the local scientific societies. In view of all this, we look to a new book, written by a gentleman of high degree, and published by the Oxford University Press, with expectations; but these are promptly doomed to disappointment. If the book is to be a general guide to the district for 'the man in the street' it is far too scrappy and far too inaccurate. If it is intended to be a book for use in schools, it is not at all suitably written, much of the information being in a style far above the ken of a schoolboy, if not of his teacher. This is probably one result of the obvious haste with which the chapters have been thrown together. In endeavouring to learn something from the author's Preface it is somewhat unexpected to find that he has gathered his information from a second-hand bookshop. We are also told that it is unnecessary to give a list of the books consulted, though at the end of his volume he gives a list of very unnecessary books, and not a single reference to any

of the volumes in which he has obviously deeply delved. We are told that the most interesting fields of research are the historic places themselves, though, with the possible exception of York (which is hardly in the Riding at all, and is therefore dealt with very fully !), there is certainly every evidence of lack of research, or anything like it. In the very first illustration (a 'simple' (!) geological map), limestone is shown where it should be clay, shale is shown where there is alluvium, and alluvium is indicated where there is no alluvium at all. And the row of tents across Holderness, and the two volcanoes (?) on the wolds, are as misleading as they can possibly be. Presumably the former represents the glacial mounds, but our author can surely never have been in Holderness. The first chapter, 'East Yorkshire in the Making,' savours strongly of a small work, 'The Making of East Yorkshire,' issued a few years ago, which has obviously been consulted, and misunderstood. To say that the east coast is being denuded, and *especially at Flamborough*, shows the need of a trip to the coast. To describe Ammonites as the 'most common' fossils on our coast does not agree with the views of those who know them, and in 'correcting a common mistake' with regard to these fossils the author falls into another. In describing the 'Tropical' Age 'Arctic' should have been written, as the animals mentioned were clothed in long fur as a protection against the cold. While it may be 'not well to accept all the geologists tell us,' but to ask for as much proof as possible, we wonder where Mr. Brockbank would be were he required to produce proofs of even a small proportion of his statements. The most antique of booksellers' shops could not produce them.

His descriptions of primitive man are equally wide of the mark, and most misleading. His localities for 'considerable collections of flint implements' are certainly wrong. Apparently a well-known Yorkshire museum has been consulted for the purpose of supplying illustrations, but either an earthquake has recently occurred in that institution and mixed up all the labels, or the author has been suffering from some form of blindness when he visited it. In one illustration a few trees on the horizon are described as a 'British Hut Circle,' though what a 'hut circle' is the gods and Mr. Brockbank only know. Another photograph shows 'Celts of the Bronze Age dug from round barrows.' They were certainly never found in barrows;—in fact the interest attaching to the particular forms figured is that they are never found with burials. The well-known Rudstone monolith is described as of 'Millstone Grit,' which it certainly is not, and the statement that 'Drewton boasts of a similar *pillar*' indicates that something must have happened to the author when viewing St. Austin's Stone during his 'research.' Similarly, coming to more modern times, we find the information similarly archaic and misleading. For instance, it must have been a tome of the period of King Charles that gave him the information in reference to 'Beverley Minster, with its Canons and their residences,' while the pretty parables about the zones of holiness at Beverley are probably the result of a very heavy supper. And what possible connection there is between Sadler's picture entitled 'Thursday' and 'East Yorkshire Monastic Life' we will leave lovers of 'problem pictures' to decide. And so we might go on to the last chapters, when His Worship the Mayor of Hull will probably be startled to learn that 'until recently' Hull owned its own telephone system. But the pages bristle with absurdities which might be amusing were the book meant to be humorous, and these, coupled with the irritating way in which the author frequently asks silly questions, and answers them himself (more or less correctly), makes one wonder what grudge the Editor can have had against the unfortunate reviewer in handing him this book.

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£10,000 has been given to the Leeds University, anonymously, for the erection of a building for a School of Agriculture.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

The Forty-second Annual Report of the Public Libraries, etc., of Rochdale, for 1912-3, contains a reference to the Museum and its recent improvements.

Journal and Transactions of the Leeds Astronomical Society for the year 1912, No. 20, Edited by Ellison Hawks. London: W. Wesley & Sons, 2s. This publication bears still further evidence of the various activities of the members of this Society. Besides full reports of the meetings and notes of various kinds appertaining to the Society's work, there are papers on the Milky Way and the Zodiacal Light by Ivo. Gregg; 'Cosmology in Early Poetry,' by Geo. Thorp, and 'The Solar Eclipse of 17th April,' and 'Stellar Occultation,' by the President, Mr. C. T. Whitmell. There are several shorter notes, by members, reprinted from other sources.

The Transactions and Proceedings of the Dumfriesshire and Galloway Natural History and Antiquarian Society for 1912-3 are better printed than usual. In his presidential address, Mr. H. S. Gladstone gives a history of the fifty years' existence of the society, with portraits of the presidents. Among other contributions we notice a list of the Macro-Lepidoptera of Wigtownshire, notes on Tumuli, French prisoners, and a ghost story. The society seems to have been seized by the prevailing epidemic for enlarging the size of its publication, though in the present case the main difference between this part and its predecessors is in the unnecessarily large margins.

Mr. W. R. Ogilvie Grant and his colleagues have given further evidence of their enthusiasm in the cause of science by the appearance of Volume XXXII. of the **Bulletin of the British Ornithologists' Club**. It has been published by Witherby and Co., and contains no fewer than 336 pages. It contains a report on the immigrations of summer residents in the spring of 1912, and notes on the migratory movements and records, received from lighthouses and light vessels during the autumn of 1911. The volume contains a remarkable classification of thousands of records and is illustrated by numerous maps showing the date and places of appearance of the important species of birds. Whenever, if ever, the problems of bird migration are finally settled, these 'Bulletins' will certainly have played an important part therein.

The Transactions of the Norfolk and Norwich Naturalists' Society, Vol. IX., pt. IV., for 1912-3 are largely devoted to a continuation of the Society's record of the natural features of its district. Mr. Robert Gurney's Presidential Address deals with 'The Origin and Conditions of Existence of the Fauna of Fresh Water.' Professor F. W. Oliver and Mr. E. J. Salisbury give an unusually valuable memoir on 'The Topography and Vegetation of Blakeney Point, Norfolk,' Mr. A. W. Preston contributes meteorological notes, and notes on the great flood in August, 1912; Mr. Claude Morley gives a list of Norfolk Ichneumons; the Rev. M. C. H. Bird deals with the attempted acclimatisation of Wild Rice in East Norfolk. There are ornithological notes by Mr. C. B. Ticehurst, botanical notes by Messrs. W. H. Burrell and W. G. Clarke; The Herring Fishery of 1912, by Mr. T. J. Wigg, and Norwich Museum Notes by Mr. F. Levey.

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The Beginner's Guide to the Microscope, by C. E. Heath. London: Percival Marshall & Co., 120 pp., 1s. net. This book is what it professes to be by its title, and by the aid of numerous illustrations the various parts of a microscope are described, as well as various accessories. There is also a 'section on mounting slides.'

NEW NATURAL HISTORY BOOKS.

An extraordinarily cheap shilling's-worth, neatly bound in blue cloth, is **Dr. P. Chalmers Mitchell's** book on '**Thomas Henry Huxley: a sketch of his life and work.**' (Methuen & Co., 276 pp.). It is based upon the work issued in 1901 by Messrs. Putnam & Sons in their '**Leaders of Science Series.**' It is a fascinating account of the life work of a charming personality, and should be carefully read by every naturalist—particularly if young.

Science from an Easy Chair: A Second Series, by **Sir Ray Lankester, K.C.B., F.R.S.** London: Adlard and Son, 1913, 412 pp., 6s. 6d. net. This is a collection of articles on miscellaneous scientific subjects, which originally appeared in *The Daily Telegraph*. The subjects vary and include notes on the edelweiss, elephants, glaciers, fern seeds, smells and perfumes, fatherless frogs, laughter, prehistoric petticoats, museums, whales, kisses, etc. There are fifty-five illustrations.

The Ocean. A general account of the science of the sea, by **Sir John Murray, K.C.B., F.R.S., etc.** London: 1913, pp. 256, 1s. net. Messrs. Williams and Norgate are certainly to be congratulated upon securing this valuable addition to their Home University Library. Who, better than Sir John Murray, could tell us of the Ocean, its waters, depths, circulation, temperatures, animal and plant life, floor deposits, etc? To attempt to criticise the book would be impudence. It is illustrated by plates, many coloured, and is a marvellously cheap shilling'sworth.

In the **Lap of the Lammermoors**, by **William M'Conachie.** Edinburgh: W. Blackwood, pp. xii. + 315, 5s. net. This volume consists of a series of charming essays, written by a devout student of nature. He describes the border parish, the golden glen, the ruin on the hill, nature's garden, etc., the title of the book defining the area he deals with. The chapters, many of which have previously appeared in *The Scotsman*, seem to convey the freshness of the moors, the burns, and the hills. The author has acted very wisely in bringing his essays together in this form. We have thoroughly enjoyed them.

The Infancy of Animals. By **W. P. Pyecraft.** London: Hutchinson and Co., pp. xiv. + 272, 6s. net. In this remarkable volume Mr. Pyecraft deals with an aspect of animal life which is too often neglected. But to the student of evolution few books have appeared in recent years which are so full of interesting, and, in many cases, unexpected facts bearing upon that great doctrine. In his studies of the early stages of the various and numerous animals with which he deals, Mr. Pyecraft shows over and over again how, in their young stages, mammals, birds, reptiles and fishes seem to live their past geological history over again. The book is written in a style that can be appreciated by anyone, specialist or beginner, and we can thoroughly recommend it.

Notes on the Natural History of **Common British Animals** and some of their foreign relations. Vertebrates. **Kate M. Hall.** London: Adlard and Son, 1913, pp. xii. + 289, 3s. 6d. net. In her well-known charming style, Miss Hall gives a fascinating account of the various British mammals and their relatives. The chief chapters refer to cats, dogs, bears, whales, hedgehogs, squirrels, pigs, horses, etc., etc. With regard to the song 'Pop goes the weasel,' which is referred to in one chapter, two explanations are given, (1) that the 'weasel' was a name given to purses, then made of weasel skins formerly thought to be particularly lucky, and (2) 'pop' means to pawn, and a 'weasel' was a flat-iron—the last household article to be parted with for necessities or extravagances. There are many diagrams and illustrations from photographs. The word 'mammals' in place of 'animals' in the title would better describe the nature of the book.

The Bodley Head Natural History. Vol. 1, **British Birds, Passeres**, by **E. D. Cuming**, with illustrations by **J. A. Shepherd**. London: John Lane, pp. 120, 2s. net. This little book is on quite new lines, the various species of birds being illustrated by scores of Mr. Shepherd's inimitable sketches, made on the wide margins, which represent hand-colouring as nearly as anything we have ever seen. The birds are shewn in remarkably characteristic attitudes, and in various stages of growth; the chapter on the robin, for example, being illustrated by no fewer than 29 sketches, as well as a coloured plate forming the frontispiece. We are glad to see the work of Yorkshire ornithologists referred to in the pages. As in so many books nowadays, the word "occurrence" seems to have given trouble to the compositors.

Pygmies and Papuans. The Stone-Age to-day in Dutch New Guinea. By **A. F. R. Wollaston**, with appendices by W. R. Ogilvie Grant, A. C., Haddon and S. H. Ray. London: Smith, Elder and Co., pp. xxiv. + 345, 15s. net. We regret there has been some delay in noticing this valuable work, but it contains such a mine of information that we decided to carefully peruse it all, and many things have interrupted. It really is one of the most charming books we have read for some time. The book is the result of the jubilee celebrations of the British Ornithological Union, when over £9,000 was subscribed for the purpose of sending an expedition—largely ornithological—to Dutch New Guinea. Mr. Wollaston saw much that appealed to the antiquary and anthropologist as well as to the naturalist, and in his book he has given us many important facts which have a distinct bearing upon the past history of even our own ancestors in Britain. The descriptions of the weapons of these people, their burial customs, ceremonies, etc., etc., have a remarkable value to students of prehistoric archaeology. The book is illustrative by a wealth of photographs, maps, etc., and will certainly take a foremost place among works of this kind.

Hampstead Heath: Its Geology and Natural History, prepared under the auspices of the **Hampstead Scientific Society**. London: Fisher Unwin, 238 p.p., 10s. 6d. net. If the Hampstead Society has done nothing more than cause the present volume to appear, it more than justifies its existence. In the historical Heath it has at once a playground and a field for work. The Society has not followed some others in serving up diluted and second-hand commonplace natural history notes, but has produced a volume that will serve as a model for all time. They have also been exceedingly fortunate in securing the co-operation of many leading geologists and naturalists, the names of Maynard, Findon, Rudler, Hawke, Tansley, Goodchild, James Burton and others, being all that can be desired as a guarantee for thoroughness and accuracy. The Heath is referred to under the heads of Topography, Geology, Climate, Plant Life, Bird Life, Mammals, Fishes and Reptiles, Insect Life, Molluscs, and Pond Life. There is also a select list of books, and a good index. The Society has been fortunate in its publisher, who seems to have spared no pains to produce an attractive and well printed volume. The frontispiece is a reproduction of a charming water-colour sketch of the Heath, by J. D. Kennedy, and there are various typical views from photographs, maps, etc. We should like to particularly commend the volume to any natural history society having a definite field for work.

Of a somewhat similar type to the preceding, but an entirely 'one man show,' is **Wild Life in Wales**, by **George Bolam**, London: Frank Palmer, pp. x. + 405, 10s. 6d. net. Many of us have recently had the pleasure of being personally acquainted with Mr. Bolam and his work, an excellent example of which, in his report on the birds of Hornsea Mere, appeared a little while ago in this journal. We were then convinced of the many-sidedness of his investigations; but for all that we little expected to find him producing, single-handed, a volume such as this, dealing with so many

aspects of Welsh wild life. Though largely ornithological, the volume deals with geology, folk lore, Welsh life, agriculture, fishes, insects, water supply, wild flowers, prehistoric remains, Roman antiquities, and so on, and all with the same apparent fluency and ease. He has also an eye for the humorous, which gives an added charm to the book. A visitor to Wales will considerably add to the value and pleasure of his visit if he first reads Mr. Bolam's book, which is exceptionally well illustrated and indexed.

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NEW BOOKS ON GEOLOGY.

The Age of the Earth, by **Arthur Holmes**. London: Harper and Bros., 1913, pp. xii. + 196., 2/6 net. Under the heads of 'The Time Problem,' 'Time and Tide,' 'Astronomical Considerations,' 'Denudation,' 'Salinity,' 'Sedimentation,' 'Radioactivity,' 'Thermal Activity,' etc., Mr. Holmes approaches this difficult subject. As, however, in the copy sent to us, page 144 is followed by pages 177-192, then 161-195, whereas pages 145-160 seem to be missing altogether, we have not been able to make out a very connective narrative. The words 'presentation copy' are also stamped in large letters across three pages, presumably in order to see that no improper use is made of this mutilated half-crown book.

Man and his Forerunners, by **H. V. Buttel-Reepen**, translated by A. G. Thacker, London: Longmans, Green and Co., 1913, x + 96 pp., 2s. 6d. net. In this well illustrated volume is an English translation of a book which has been well received on the continent, though the recent important discovery at Piltdown, Sussex, particulars of which are included, makes the English edition even more welcome. The author gives a good summary of the more important discoveries of ancient human and human-like remains, the Neandertal, Heidelberg, Spy, and Javan relics being illustrated and carefully reviewed. Prof. Buttel-Reepen's little book forms a welcome summary of this interesting subject, and is especially welcome at the present time.

The Centenary of a Nineteenth Century Geologist. **Edward William Binney, F.R.S., etc., etc.** [By **James Binney**]. Taunton, 58 pp. In this volume the author gives many details of the life and work and worries of his father, who was well known as a worker in Lancashire and Yorkshire, particularly in the Coal Measures. Binney, the elder, was identified in one way or another with Morton Village, Gainsborough, Chesterfield, and Douglas, Isle of Man, and photographs of churches, piers, the Trent aegir, etc., are therefore reproduced. The book relates many little incidents relating to the early days of geological science. There are too many misprints for so small a work, among the more glaring being 'gunnister,' 'Muschelolinct,' 'dadoxylon Oldhamensis,' 'modules,' and 'munifera.' We must say we were very surprised to learn that Binney was the author of 'ninety-five volumes on scientific subjects.'

Determinative Mineralogy, with Tables for the determination of minerals by means of their chemical and physical characters, by **J. Volney Lewis**, New York and London: Chapman and Hall, 1913, pp. 150. 6s. 6d. net. This volume with its extraordinary array of tables has been prepared primarily 'for the use of students in determinative mineralogy, but it has also been made sufficiently inclusive to meet the demands of the geologist and the mining engineer in all but the rarer cases. The accompanying tables include 380 minerals, or from 100 to 150 more than are fully described in the current text books. Besides the more common minerals and those of economic value as ores or otherwise, many of the less common and even rarer species have also been included. Some idea of relative importance is suggested by the sizes of type in which the names are printed. Those that have been omitted are very rare and, from a practical point of view, of little importance.'

CORRESPONDENCE.

ECOLOGICAL METHODS OF SOIL ANALYSIS.

Mr. W. B. Crump's reply to my criticism¹ has certainly elucidated many points which were somewhat obscure in the original abstract, but, unfortunately, Mr. Crump entirely overlooks the main point with regard to the "water-content" figures given by the authorities he quotes.

It is very evident from the table of results for four distinctive soils given by A. D. Hall in his standard work² that there is something 'more than a verbal difference' between 'water absorbed' by 100 parts of dry soil to make it moist and the 'water-contained' per cent. in that moist material. Further it will be noticed that it is only in the 'water-absorbed' column that the figures approximate and occasionally exceed 100.

There are three recognised forms for expressing 'water-capacity'—

- (a) 'Water-absorbed' by 100 parts of dry sample (100°C.).
- (b) Percentage by weight of water in sample.
- (c) Percentage by volume of water in sample.

The first method is the least satisfactory and its only redeeming feature is that it entails the consideration of but one variable quantity, viz., the water. This method is very useful when one wishes, for instance, to record changes in the humidity of peats over a long period, for obviously in the other forms as the water increases the percentage of the dry constituents decreases, thus making ready comparisons somewhat difficult; unfortunately the figures above 30 or 40 per cent. become unduly large when compared with the results given by the other methods.³ The soundest idea of the actual state of affairs is perhaps given by (c) but this entails considerable additional labour, whereas in (b)—the form suggested by the writer—the results are not liable to any misconception, as it will be seen that the same figure serves both for 'water-capacity' and 'water-content,' on the other hand the figures given in the abstract should be severely restricted to 'water-absorbed' and their use as 'water-content' is not only scientifically incorrect but also an outrage on the common acceptance of the term 'content.'

Reference to the later analytical results given by Mr. Crump⁴ still further illustrate the confusion occasioned by the mis-use of this term. Thus soil No. 172 is stated to have a water-content of 24.8 per cent.; immediately following this is a 'Loss at 100°C.' of 5.92 per cent. This latter is really the moisture⁵ or true 'water-content' of the air-dried soil. The presence of two different 'water-contents' in the same soil is certainly still confusing, if not paradoxical, even though covered by a guise of terminological differentiation. The most unfortunate part of the reply, however, is where Mr. Crump fails to unravel the tangle on page 170 and then imputes to me certain vindictive intentions whereas I merely wished to suggest that the 'convenient method' given for estimating the humus content, i.e., $\frac{\text{humus}}{\text{mineral}}$ was obviously incorrect, and that it was most probably a slip or printer's error. The defence of this equation involves the accuracy of the whole paper, for whereas formerly 'water-content' had been confused with 'water-absorbed' ratio—with percentage composition amounts, etc., etc., we now find that the cardinal point of the whole paper—humus-content—rests on uncertain ground.

With regard to the abstract nature of the paper criticised, I have been

¹ *The Naturalist*, 1913, pp. 239-241.

² *The Soil*, Second Edition, page 69.

³ *The Naturalist*, page 169, 1913.

⁴ *The Naturalist*, page 241, 1913.

⁵ *The Soil*, Second Edition, Appendix I., page 300. Analyses of typical soils.

unable to find a more detailed account, but the length of the abstract was quite sufficient to admit of a clear statement !

The two essential points of this abstract are :—(1) the so-called water-content figures and (2) the convenient method formula for obtaining the humus-content.

(1) The term 'water-content' has a very definite and restricted meaning, *i.e.*, the amount of water which a given substance contains—and if expressed as a percentage composition—the sum total of the constituents must amount to 100. Thus three wet peats might have the following compositions :—

Water	..	..	90.0	80.0	60.0
Humus	..	..	9.7	18.0	35.0
Ash or Mineral	..	..	.3	2.0	5.0
<hr/>				<hr/>	<hr/>
100.0				100.0	100.0
<hr/>				<hr/>	<hr/>

and these when dry would contain :—

Humus	..	..	97.0	90.0	87.5
Ash	..	..	3.0	10.0	12.5
<hr/>				<hr/>	<hr/>
100.0				100.0	100.0
<hr/>				<hr/>	<hr/>
Water absorbed	..	..	900	400	150

But Mr. Crump *prefaces* each of the second series of figures by the *amount of water which was originally associated with the 100 parts of the now dry peat*, viz., 900, 400, and 150, and does not make the slightest distinction between this water which the peat *did contain* and the true constitutional percentage of the dry peat. This is further complicated by a 'refinement' whereby the standard 'dry' peat is 'air-dry,' and therefore still contains some moisture, *the amount of which is not given*. It obviously follows that these amounts 'being additions to the 100 parts' are in no sense 'content' figures, but slight variants—for the reason given above—of the water absorbed figures under the existing humidity conditions at the time of sampling, and are comments upon the analyses which naturally they should follow.

One would like to know what further justification there is for adopting a 15°C. air-dried basis in preference to the usual 100°C. basis.

It is a well-known laboratory practice to air-dry soils for convenience in storing. The temperature used is generally about 15°C. because this temperature does not seriously affect the physical properties of the material, as would be the case if a higher temperature were used. This basis is both essential in laboratory work and useful for comparative purposes, but to attempt to establish it as a standard is a very serious matter, and such needless and useless additions should be severely deprecated. The mere unavailable nature for plant-life of the water remaining at 15°C. cannot justify adding another to the already too long list of standards, for obviously this is but a partial statement regarding the amount of unavailable water as much of that *lost* at 15°C. is likewise unavailable. Heinrich has already shown that peat-vegetation wilts when the amount is from 2-3 times that of the air-dried material, and necessarily plants vary in their capacity for utilising such water so, strictly speaking on such a basis a different drying temperature should be adopted for each plant or plant association.

Furthermore, the substitution of this 15°C. basis for the more general 100°C. renders useless for comparative purposes countless thousands of analyses already on record, and totally annuls the advantage of the 'water-absorbed' basis used by Mr. Crump because a second variable

is now introduced, *i.e.*, the amount of water in air-dried peat, while, on the other hand the error occasioned by adhering to the 100°C. basis would not be very appreciable, numerous other advantages of its use are obvious.

(2) The other important point is a question of arithmetic. The ratio $\frac{\text{humus}}{\text{mineral}}$ is quite incapable of yielding any measure of the humus-content of peat. A few concrete examples will best illustrate this point, and for argument's sake, suppose the peats have the following percentage compositions:—

Humus	..	..	99·9	99·0	95·0	90·0
Mineral	..	..	·1	1·0	5·0	10·0
			<hr/>	<hr/>	<hr/>	<hr/>
			100·0	100·0	100·0	100·0
			<hr/>	<hr/>	<hr/>	<hr/>
$\frac{\text{Humus}}{\text{Mineral}}$	..	..	999·0	99·0	19·0	9·0

then, according to the 'convenient method,' the third line, which is obtained by dividing the first by the second, gives the humus content. Even a casual comparison of the first and third lines will suffice to establish the absurdity of the above equation.

There is only one other point to which I desire to draw attention, and that is the exception taken to the statement that peat contains 80 to 90 per cent. of moisture, and when air-dried 15 to 25 per cent. It is quite beyond the scope of the present note to enter into a discussion of the accuracy of such a well-known and generally accepted scientific fact, one can only add that reference to the most recent literature¹ fully justifies the original statement, and that the suggested changed standard of comparison is purely imaginary.

J. W. H. JOHNSON,
Walton, Wakefield.

22nd August, 1913.

—: O :—

Igneous Rocks, Vol. II., Description and Occurrence, by **Joseph P. Iddings**, 8vo. pp. xi. + 685. New York: Wiley and Sons, 1913. This volume fully maintains the high standard of its predecessor, issued four years ago, and of 'Rock Minerals,' now in its second edition; and the work, as now completed, should be in the library of every serious student of petrology. In our notice of volume I. we confessed a curiosity as regards how the author would give effect to a systematic treatment of igneous rocks on the lines of the 'Quantitative Classification,' to which he was committed. It would seem that trial has proved the impossibility of the task, for the scheme actually adopted follows, in its broad outlines, a more familiar plan. As a first step, the rocks are ranged in six divisions, according as they are characterized by (1) preponderance of quartz; (2) quartz and felspar; (3) felspar without quartz; (4) felspars and feldspathoids; (5) feldspathoids, and (6) chiefly ferro-magnesian minerals. This is decidedly more acceptable than Persalane, Dosalan, and the rest. Group names, such as Syenite and Monzonite are used, but in many instances are redefined to introduce the element of numerical precision. The systematic description occupies the first half of the volume. The second half is a more original contribution, being an account of the geographical distribution of different kinds of igneous rocks over the globe. It brings together in connected form a large body of information, and will certainly be found very valuable for reference. The maps given in illustration of this part of the work would be more useful if the geological age, as well as the distribution, of the igneous rocks had been indicated.—A.H.

¹ 'Dictionary of Applied Chemistry,' by Sir Ed. Thorpe, page 606. Longmans, Green & Co., 1912.

NEWS FROM THE MAGAZINES.

Colias edusa was taken at Bridlington on September 7th (*The Entomologist*, for October).

Vol. IV., Part 4, of the *Hull Literary Club Magazine* contains a paper on the 'Lost Towns of the Yorkshire Coast' by Mr. T. Sheppard.

A swallow ringed at Skelmorlie, Ayrshire, on July 27th, 1912, was caught in the Orange Free State on March 16th, 1913 (*British Birds*, Nov.).

Mr. R. S. Bagnall records *Euconnus nanus* and *Euthia schaumii*, two scydmaenids new to the fauna of Northumberland and Durham, in *The Entomologist's Record* for October.

We have received part I. of *Children's Museum News*, a journal specially printed for the young visitors to the Children's Museum, Bedford Park, Brooklyn, N.Y.

The New Phytologist for October contains a paper dealing with investigations on *Polyporus squamosus*, the Saddle-back fungus, by S. R. Price, and 'The Determining Factors in Petiolar Structure,' by E. J. Salisbury.

Volume 2, Part 2, of *The Journal of Roman Studies* contains a paper by Professor Haverfield on Roman Coast Defences of Britain, especially in Yorkshire, and another on 'The Roman Fort at Huntecliff, near Saltburn,' by Messrs. W. Hornsby, R. Stanton, and others.

In the *Geological Magazine* for October, Dr. A. Smith Woodward describes a tooth lately found at Piltown, Sussex, apparently belonging to the primitive skull which he has previously described. The tooth is described as markedly ape-like. In the same journal Mr. R. M. Brydone describes some new chalk Polyzoa, under the names *Cribrilina suffulta*, and *C. cacus*.

In the *Selborne Magazine* for November is an excellent article by Mr. F. Heatherley, on 'Hiding Contrivances,' in which he shows how success in bird photography is attained. We agree with him that 'it is a pity some photographers, in order apparently to enhance the value of their achievements, have, in the past, laid so much stress on the discomforts they have undergone.'

In *The Entomologist's Record* for October Mr. G. T. Bethune-Baker gives some 'Observations on Dr. Verity's Review of the Linnean Collection and his suggested Nomenclatorial Alterations' in which he states he has been endeavouring to reconcile himself to Dr. Verity's drastic changes, but the more he reviews the situation the more he feels the impossibility of accepting his alterations.

In *The Entomologist* for November are records of *Lycæna astrarche*, *C. edusa*, and *A. atropos* from Derbyshire; *Emmelesia taniata* from Westmorland, and *Mutilla europæa* from Robin Hood's Bay. The last, by Professor R. Meldola, refers to the illustration of this insect (which he claims as the third record for Yorkshire) in Mr. Elgee's 'Moorlands of North-East Yorkshire,' about to be published at Middlesborough! The third Yorkshire record of this species, however, was published in *The Naturalist* for 1908, p. 193.

We have received a remarkable paper on 'The Wonderful Sights of an English Clover Field,' by Mr. A. H. Swinton, reprinted from the *Abzug aus Societas entomologica*, though it seems odd that it has been necessary to go abroad to get it published. He has a far-fetched sun-spot theory to account for the periodic appearances of *Colias edusa* in Britain, whereas, of course, it more depends upon the direction of the wind at the time of its emergence on the continent. The immigrants deposit eggs in our southern counties, which hatch, but the insects succumb to our climate. The suggestion the author makes that the eggs reach England with clover seed is impossible, nor can the species hibernate in England.

NORTHERN NEWS.

Boxhill, one of the beauty spots near London, has been saved from the hands of the jerry-builder by an anonymous benefactor.

From a newspaper report we learn that 'Daddy-long-legs' 'is one of the species Arachnida, which means that he is a spider. At one time he was classed as an insect, but Lamarck separated him from them, and now he is catalogued along with scorpions and mites'!

Professor T. McKenny Hughes describes a skull and antlers of unusually large size (twelve and a half inches round the burr) from the estuary of the Gilpin, in the *Transactions of the Cumberland and Westmorland Antiquarian and Archæological Society*, Vol. XIII., N.S., for 1913.

We regret to note the announcement of the death of W. H. Sutcliffe, F.G.S., of Rochdale, who did some excellent work in Lancashire. He had much to do with the investigation of the fauna of the Middle Coal Measures at Sparth, Rochdale, and two fossil plants and a fossil arachnid were named after him.

In a notice of the Notes and Comments in *The Naturalist* for October, the writer of a well-known natural history column states that we 'approached the vast realm of psychology with plainly unaccustomed footsteps.' This seems rather rough on Sir Oliver Lodge, seeing that we admittedly merely gave quotations from his address!

Mr. R. S. Bagnall, in reviewing a year's field work (*The Entomologist's Record* for September), states that in the Northumberland and Durham district, the year had been 'an extraordinarily fruitful one, the additions to the local fauna now being between two and three hundred, and the additions to the British fauna being summarised as follows:—One order (*Protura*, Silvestri), four families (*Acerentomidæ* Silv., and *Eosentomidæ* Berlese, in the *Protura*, *Brachypauropodidæ* Hansen, in the *Pauropoda*, and *Brachychaeteumidæ* (nov.), Verhoeff, in the *Diplopoda*, several genera, and about sixty species of which thirteen or fourteen were new to science.'

Through the kindness of Mr. Foster, of Bradford, there is on loan at the Cartwright Hall Museum, Bradford, at the present moment, a magnificent series of birds. These have been chiefly shot in the Orkneys and Shetlands by Mr. Foster, and as they have been mounted by one of our leading taxidermists they form a very attractive and educational exhibit. Two huge Ravens will attract attention; but their size has apparently been increased somewhat by the taxidermist, although the larger bird is a very fully adult male—judged by the thickness of his neck, and by the length of the feathers thereon. A large case containing a pair of Magpies with their nest and eggs in the original bough, is very artistic, and they are local specimens, viz., from Northowram.

We notice from the cover of the September number of the *New Nature Study*, the following very definite statement:—'Huddersfield Museum.—There is no truth, whatever, in the editorial paragraph which appeared in the September *Naturalist* referring to this museum.' It is perhaps difficult to define 'truth,' but we have a circular before us headed 'To Naturalists' Societies, Mutuals, Art Clubs, etc.' One of the paragraphs reads 'The museum is open daily and refreshments may be obtained. Societies would do well to arrange trips to this museum. It is not a place of amusement, but an educational institution.' This is practically what was stated in our three line 'editorial' in September. The circular is signed 'S. L. Mosley, Curator,' and it was sent to us by Mr. Mosley himself. However, as Mr. Mosley states that there is no truth whatever in the paragraph which we quoted, we must assume that his museum is not open daily, that there are no refreshments, that societies had better keep away, as the place is not an educational institution but a place of amusement. We have now given Mr. Mosley's two descriptions of his own place, and we must leave our readers to judge for themselves which is correct.

CLASSIFIED INDEX.

COMPILED BY W. E. L. WATTAM.

It is not an index in the strictest sense of that term, but it is a classified summary of the contents of the volume, arranged so as to be of assistance to active scientific investigators ; the actual titles of papers not always being regarded so much as the essential nature of their contents.

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Plate VII., figure B, for "ventral aspect," read "larva."

Page 91, line 45, for "Kow," read "Kew."

Page 109, line 23, for "Figure A," read "Figure C."

Page 172, line 50, for "Microscopic," read "Macroscopic."

Page 235, lines 14-15 from bottom, for "Chrysomelus," read "Chrysomela,"
and for "Politus," read "Polita."

Page 235, line 7 from bottom, insert "Licensed " after "Grit."

Page 236, line 23, for "Raydon's," read "Ravens."

Page 236, last line, for "Anticlining," read "Slikensliding."

Page 237, line 14, for "fault," read "Valley,"

Page 237, line 16, for "Larches," read "Birches."

Page 280, "X3" on top of map should be "X2."

Page 289, line 8 from bottom, for "rules" read "notes,"

Page 290, line 5, for "hobat," read "holst."

Page 303, line 20, for "cohæreus," read "cohærens."

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